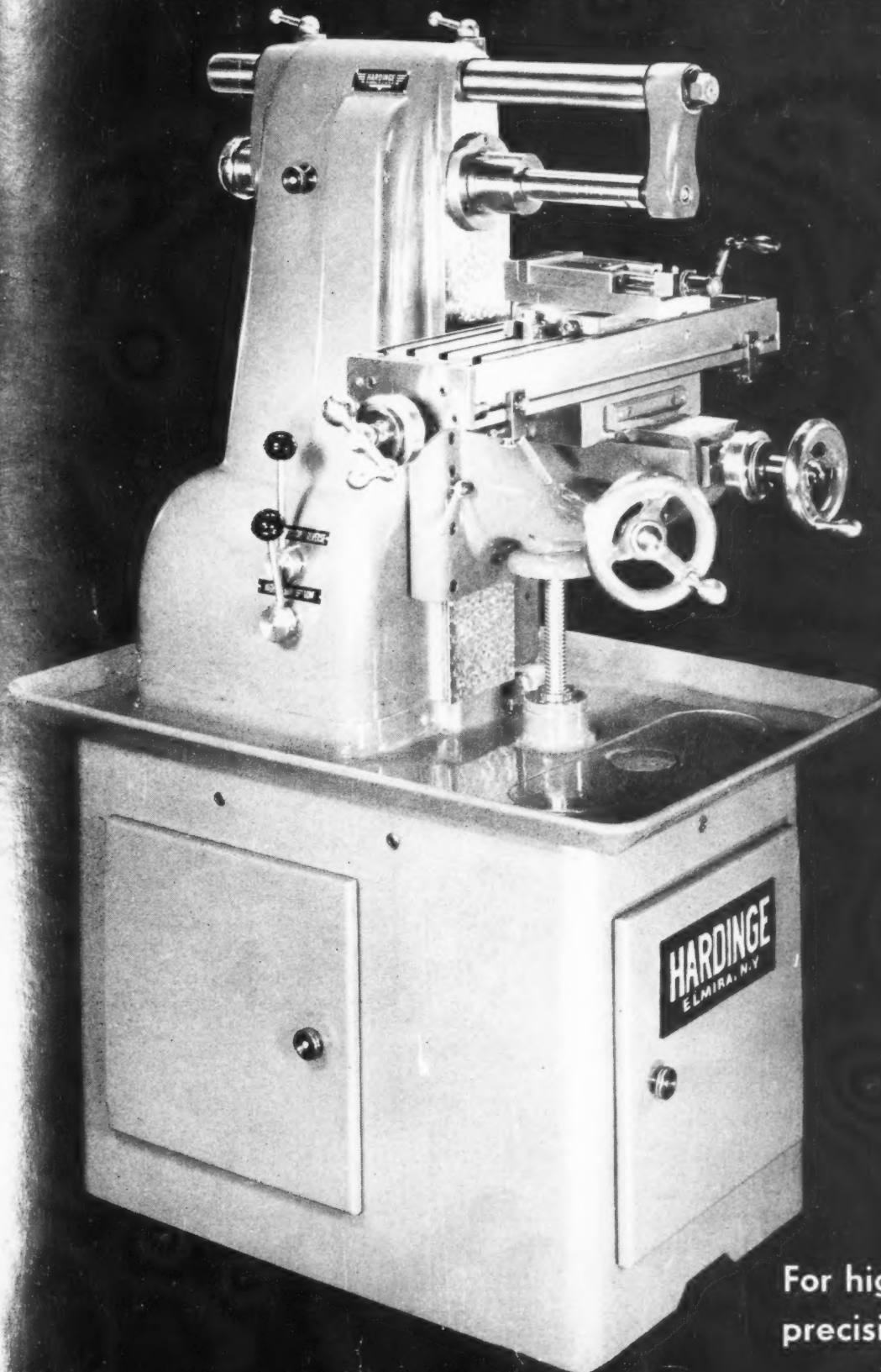


DECEMBER 1946 — FIFTY-THIRD YEAR

MACHINERY



For high speed
precision milling

Improved

"MAXI"

Surface Treated Taps

You can again get "MAXI" surface treatment on "Greenfield" Taps at no extra cost.

"MAXI" was a pre-war champion when it came to tap performance. Today's "MAXI" is *better than ever*. Intensive research in "Greenfield's" metallurgical laboratory during the war has produced better formulas for surface treatment.

WHAT IS "MAXI" FINISH?

It is a heat treatment applied to High Speed Steel tools which imparts a surface hardness greater than that of an untreated tool. This surface is applied by a chemical bath. It does not affect the basic character of the metal nor the size of the tap.

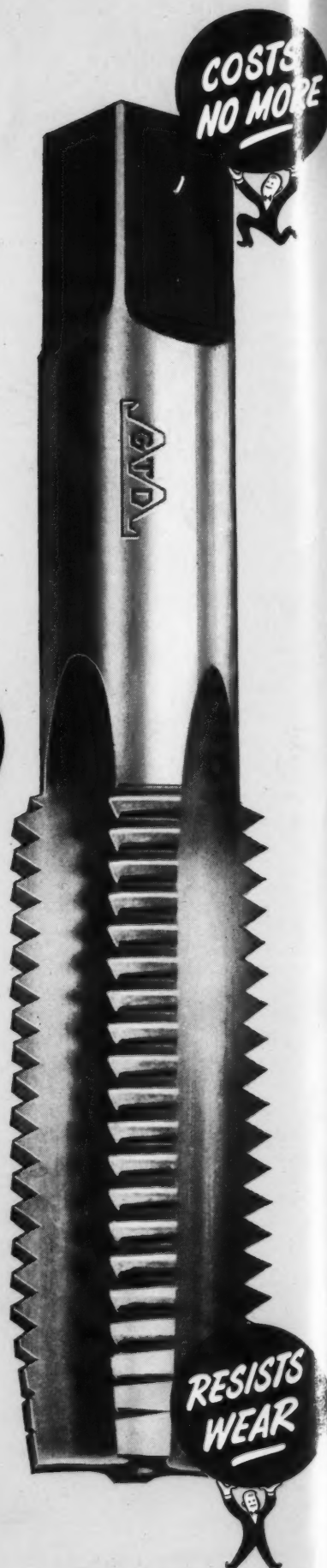
COSTS NO MORE!

You can get a "MAXI" surface treatment on any "Greenfield" HIGH SPEED tool, regular or special, in any size at no additional cost. Simply add the word "MAXI" when ordering.



GREENFIELD

GREENFIELD TAP and DIE CORPORATION
GREENFIELD • MASSACHUSETTS



MACHINERY

VOLUME 53

DECEMBER, 1946

NUMBER 4

Editor

CHARLES O. HERB

Associate Editors

FREEMAN C. DUSTON
HOLBROOK L. HORTON
CHARLES H. WICK
VALLORY H. LAUGHNER

Consulting Editors

ERIK OBERG
FRANKLIN D. JONES

Published Monthly By
THE INDUSTRIAL PRESS

148 Lafayette St., New York 13, N. Y.

ROBERT B. LUCHARS
President

EDGAR A. BECKER
Vice-President and Treasurer

HAROLD L. GRAY
Secretary and Publishing Manager

Advertising Representatives

LOUIS PELLETIER
WALTER E. ROBINSON
DWIGHT COOK

148 Lafayette St., New York 13, N. Y.

EDWARD K. HAMMOND
228 N. La Salle St., Chicago 1, Ill.

BOYCE M. TOPE
3032 Vicksburg Ave., Detroit 6, Mich.

DON HARWAY & COMPANY
816 W. Fifth St., Los Angeles 13, Calif.
68 Post St., San Francisco 4, Calif.

Subscription Rates: United States and Canada, one year, \$4; two years, \$7; three years, \$8; foreign countries, \$7 a year. Single copies, 40 cents. Changes in address must be received by the fifteenth of the month to be effective for the next issue. Send old as well as new address. Copyright 1946 by The Industrial Press. Entered as second-class mail matter, September, 1894, at the Post Office, New York, N. Y., under the Act of March 3, 1879. Printed in the United States of America.

British Address:
National House, West St.
Brighton 1, England.

PRINCIPAL ARTICLES

- Ingenious Work-Transfer Mechanisms for Progressive Dies
By Charles O. Herb 139
- Assembling Operations in a Fisher Body Plant - - - 148
- Machining Huge Aluminum Slabs on Scalper of Unusual Design 150
- Chip-Removal and Coolant-Temperature Regulating System - 151
- Strengthen the Industry-Ordnance Team in Days of Peace
By Charles O. Herb 155
- How Special Blending Improves Cutting Fluids
By James T. Beard, Jr. 156
- Large Dome Formed from Transparent Plastic Sheets - - - 162
- Gear Manufacturers Give Attention to Broad Problems of Industry 164
- High-Speed Assembly of Radiators by Induction Soldering - - 166
- Designing Parts for Powdered-Metal Production
By Irving J. Donahue 169
- Industrial Relations Main Topic of National Metal Trades Meeting 180

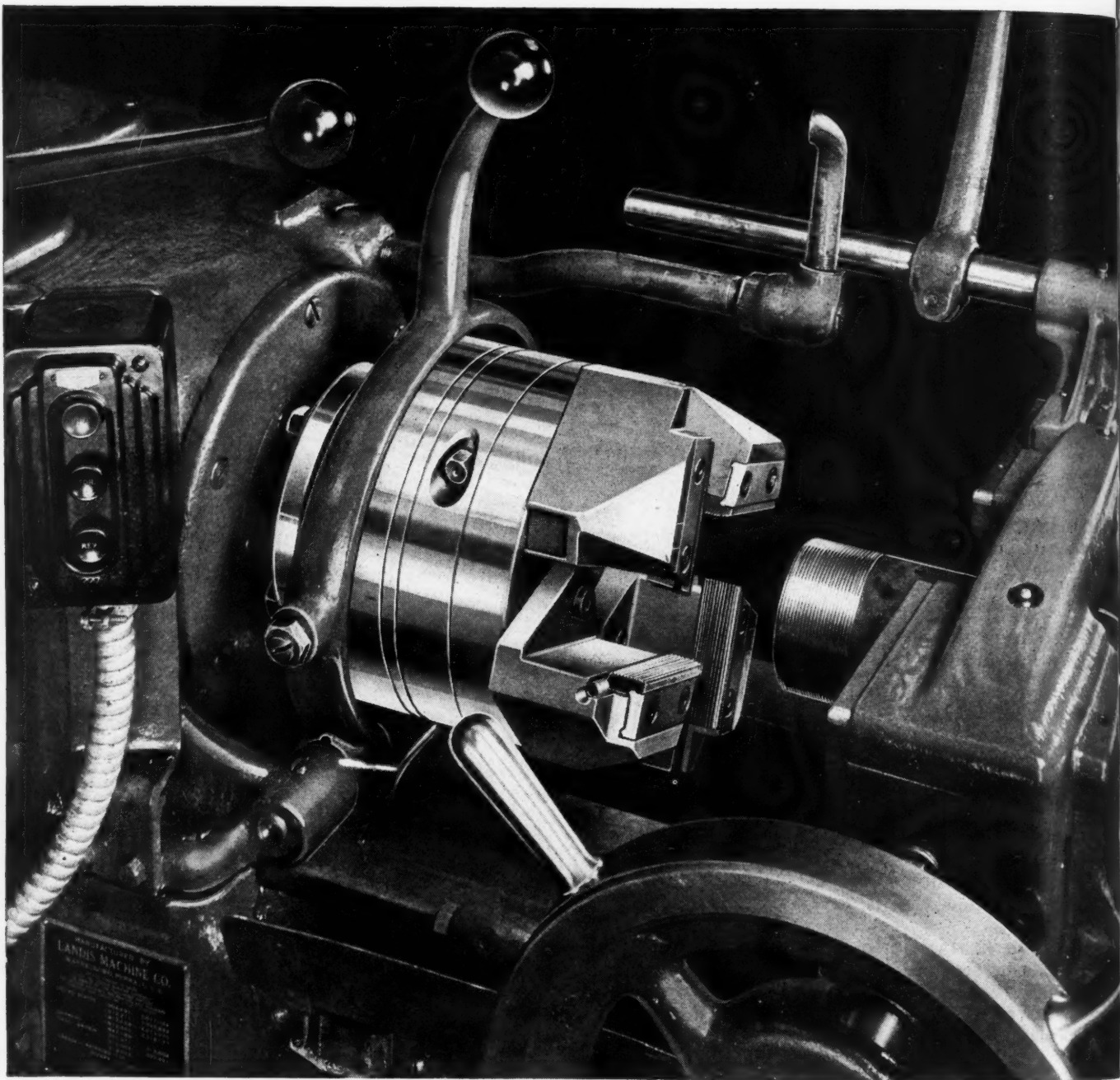
DEPARTMENTS

- Engineering News - - - - - 168
- Ingenious Mechanisms - - - - - 172
- Tool Engineering Ideas - - - - - 175
- Materials of Industry - - - - - 178
- Shop Equipment News - - - - - 181
- New Trade Literature - - - - - 215
- Data Sheet - - - - - 219
- News of the Industry - - - - - 221



For Complete Classified Contents, See Page 232
Product Index 390-404 Advertisers Index 407-408

LANDMACO



The 1½" LANDMACO Single Head Leadscrew Threading Machine illustrated has a standard capacity of ¾" to 1½". However, machine is equipped with 1½" Lanco Die Head fitted with oversize chaser holders for producing 3½" diameter 12 pitch threads on pump stators.



Landis

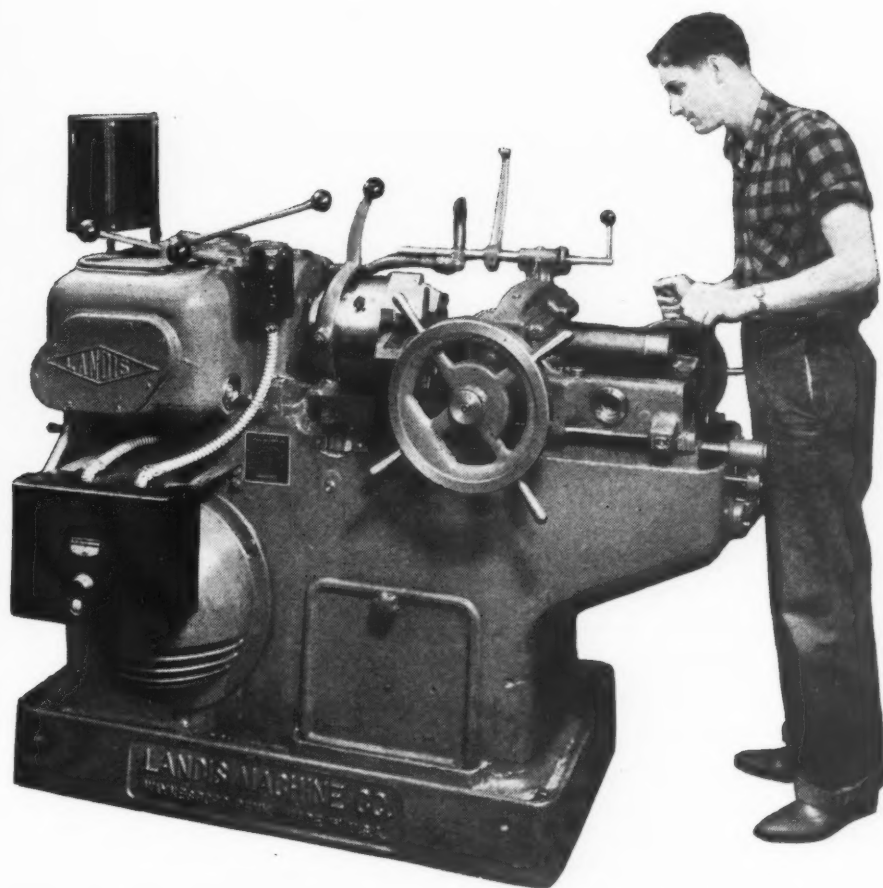
THREADING MACHINES

For Speed, Accuracy and Economy on a Wide Variety of Threading Jobs

Nine outstanding features—eight speed selective type gear box, vertical and horizontal adjusted carriage front; leadscrew attachments; anti-friction bearings on which gear shafts, leadscrews and spindles operate; wipers for bed guides; rack and pinion operated carriage; silent chain drive; and semi-steel bed cast in one piece with transverse bracing members; as well as double wall support for machine guides.

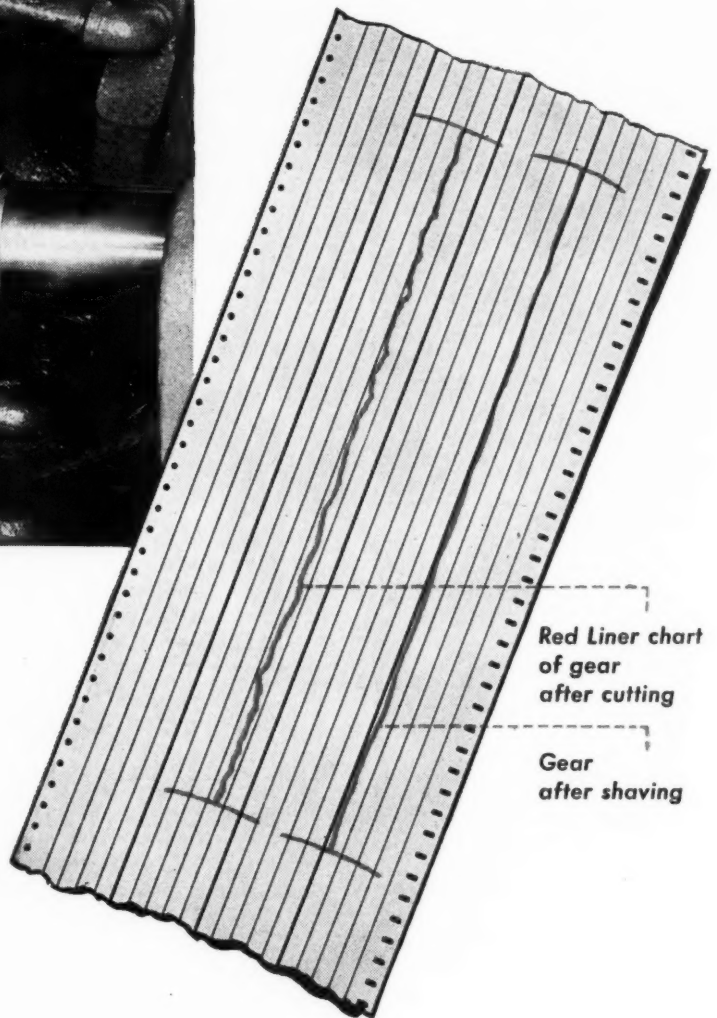
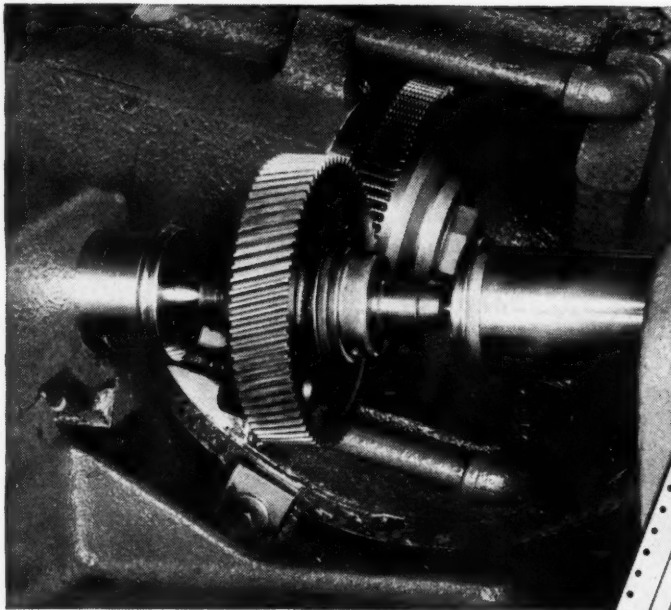
LANDMACO Threading Machines are built in 1" and 1½" Single, Double and Quadruple models as well as 2" and 2½" Single and Double models.

Send for Bulletin H-75



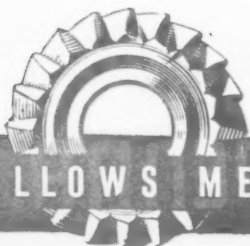
**MACHINE CO. WAYNESBORO
PENN. U.S.A.**

Shaved GEAR PRECISION IN



FELLOWS SHAVED GEAR PRECISION IMPROVES MODERN TEXTILE MACHINERY

- ✓ by...ultra precise control of shaft and spindle speeds
- ✓ by...capacity for higher operating speeds throughout
- ✓ by...velvety smoothness and longer wear
- ✓ by...vastly improved quiet...for the working comfort of mill operatives



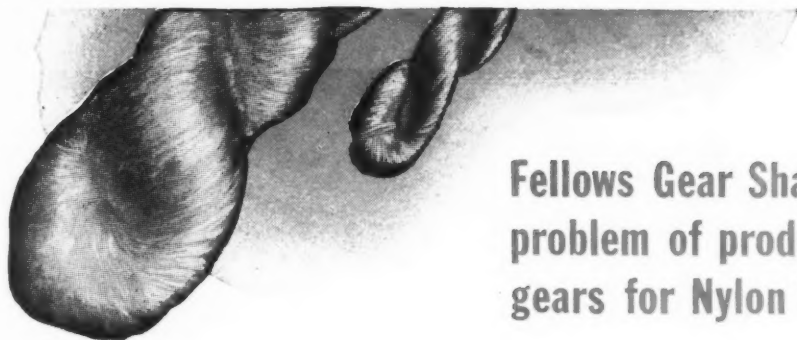
● **GOVERNMENT SURPLUS MACHINE TOOLS:** We are licensed under the WAR ASSETS ADMINISTRATION to act as dealers in the disposal of Government Surplus Machinery. Those interested in obtaining such machinery should contact our Main Office, Springfield, Vt.; or our offices in Detroit, Mich., and Chicago, Ill.

THE FELLOWS METHOD...MACHINES AND TOOLS FOR



DEMANDED

MODERN TEXTILE MACHINES



**Fellows Gear Shaving solves
problem of producing precision
gears for Nylon Textile Machines**

Absolute size uniformity of nylon thread and other man-made fibers demands textile equipment of a new order...re-designed to incorporate higher speeds and dependable precision of functioning.

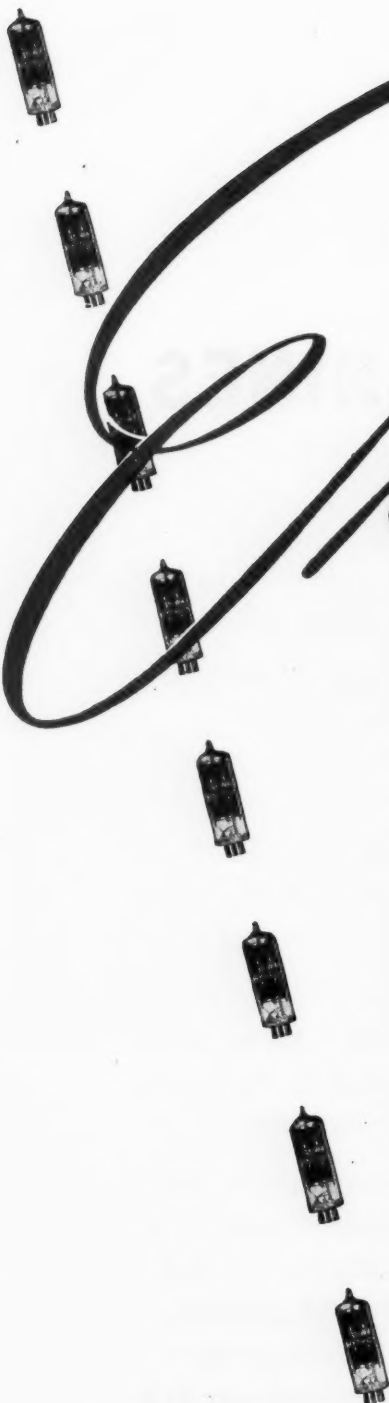
The related motions of various machine elements must be held to closer tolerances in relative speeds. Lighter machine parts, faster action is the order of the day. Gears that were adequate in pre-war manufacture cannot measure up to the operating requirements of later equipment.

Precision-cut gears had to take over, and, for a growing category of uses, shaved-gear accuracy is demanded. High speeds and quieter operation are everywhere in demand, necessitating higher gear quality for which the Fellows Method stands sponsor. Textile machine designers and production men will find much of interest in our 64 page book "The Fellows Method". Write: The Fellows Gear Shaper Company, Springfield, Vermont—or 616 Fisher Bldg., Detroit—or 640 West Town Office Bldg., Chicago.

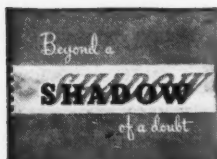
Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

Extreme



Photograph courtesy HYTRON RADIO AND ELECTRONICS CORPORATION



Probably a Jones & Lamson Optical Comparator could effect comparable savings for you. Write for our book, "Beyond a Shadow of a Doubt." Or, better still, ask for one of our inspection engineers to call and discuss your inspection problems.



Precision

The extreme precision required in the manufacture of radio tube components demands exacting control. The most modern inspection methods must be used.

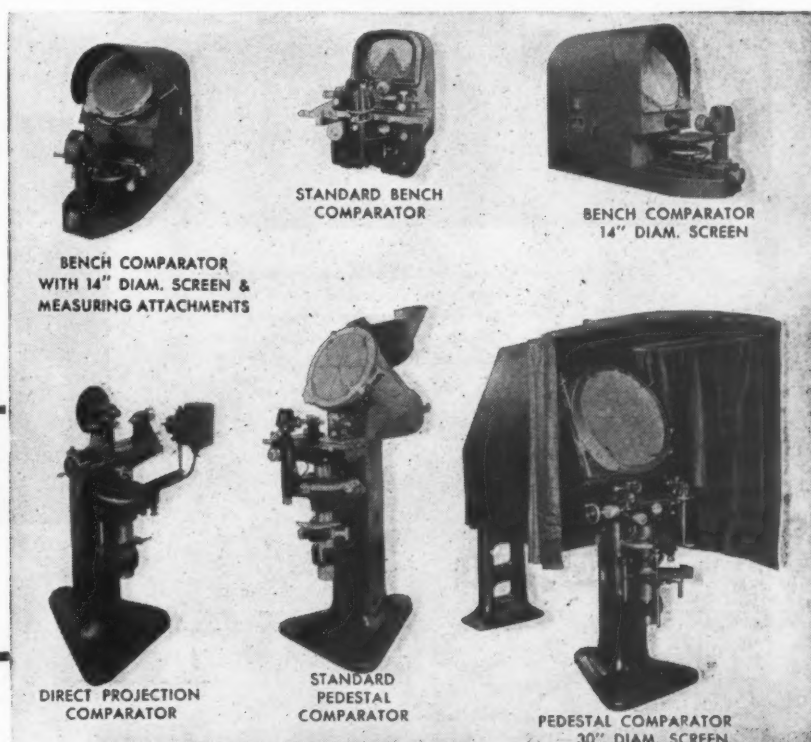
Jones & Lamson Optical Comparators are used to measure the dimensions and orientations of the punched holes in radio tube micas to tolerances of .0001", easily and rapidly. Many other components are also inspected by this method—plates, shields, leads, cathode sleeves,

radiators, grids, and filament springs. By any other method, inspection would be a slow and tedious business and the inspection department a costly bottleneck.

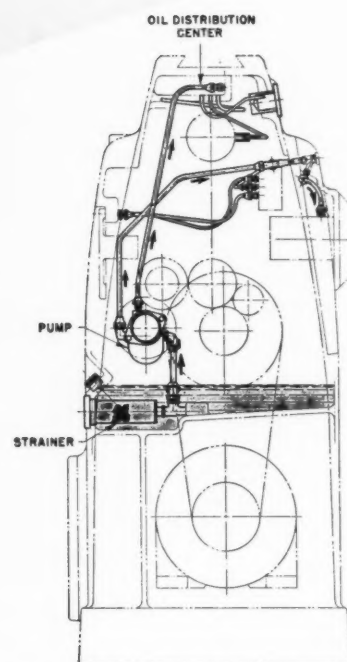
Our engineers are inspection specialists, their knowledge of holding fixtures, handling methods and suitable Comparator equipment has saved thousands of dollars in manufacturing plants throughout the country. Call, write or wire for their service today.

JONES & LAMSON MACHINE COMPANY SPRINGFIELD, VERMONT, U. S. A. OPTICAL COMPARATORS

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies.



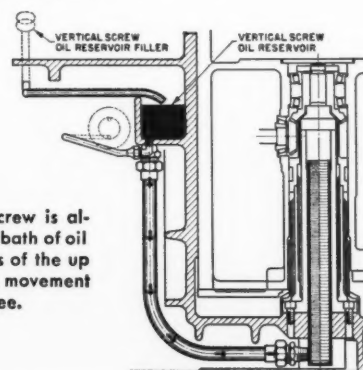
Long Life, *YES...*
and **ACCURACY**
throughout the years



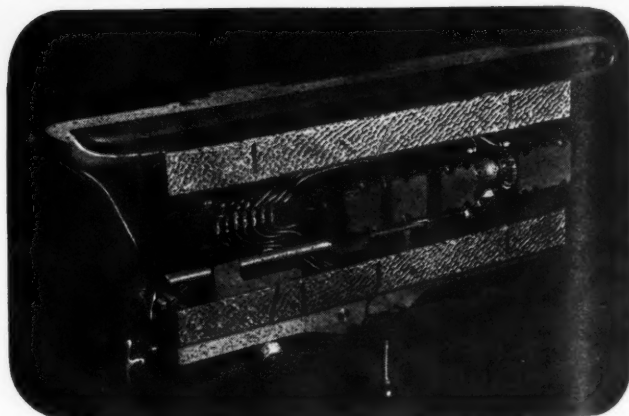
Gears and bearings don't wear because of automatic lubrication of all parts within the column. And it's no trouble for the operator to clean the oil strainer.



Above: All saddle parts and the table ways are lubricated with a few strokes of the conveniently located plunger. Right: Top side of saddle shows arrangement of lubricating lines.



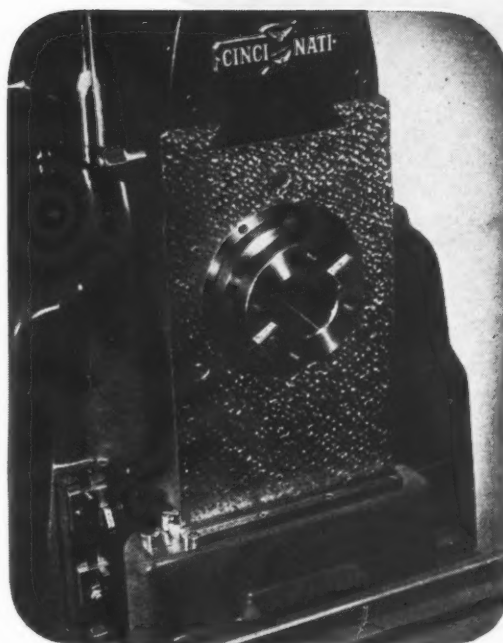
Vertical screw is always in a bath of oil regardless of the up and down movement of the knee.



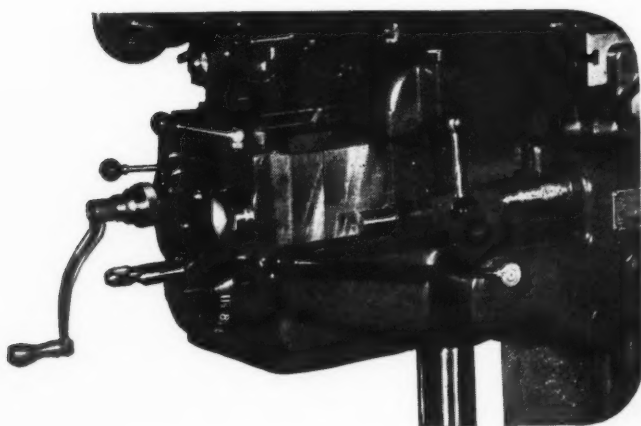
THE CINCINNATI

MILLING MACHINES

● The useful life of a machine tool has always been a much discussed question. Admittedly, it does extend over a number of years, but during the machine's entire life span it should maintain productivity of accurate work. ¶ On these pages are illustrated a few of the features that retain built-in accuracy for many years in the new CINCINNATI No. 2 MI Milling Machines. They are important, not as features alone, but in getting the greatest value for your machine tool investment. ¶ Check over the machine tools in your shop. After three, five, seven, or even ten years, are they still turning out work as accurately as they did the first year? Probably not, and that's why you should consider replacing your No. 2 millers with new CINCINNATI No. 2 MI's. We'll be glad to give you complete information. Write for catalog M-1506. The CINCINNATI No. 2 MI Milling Machines are available in Plain, Universal and Vertical styles.



The heavy apron extension helps keep the knee in perfect alignment with the column. A wiper is built into the top of the apron to keep clean the hand-scraped bearing surface of the column.



Dust and dirt are kept away from the cross feed screw by sliding covers on the side of the knee.



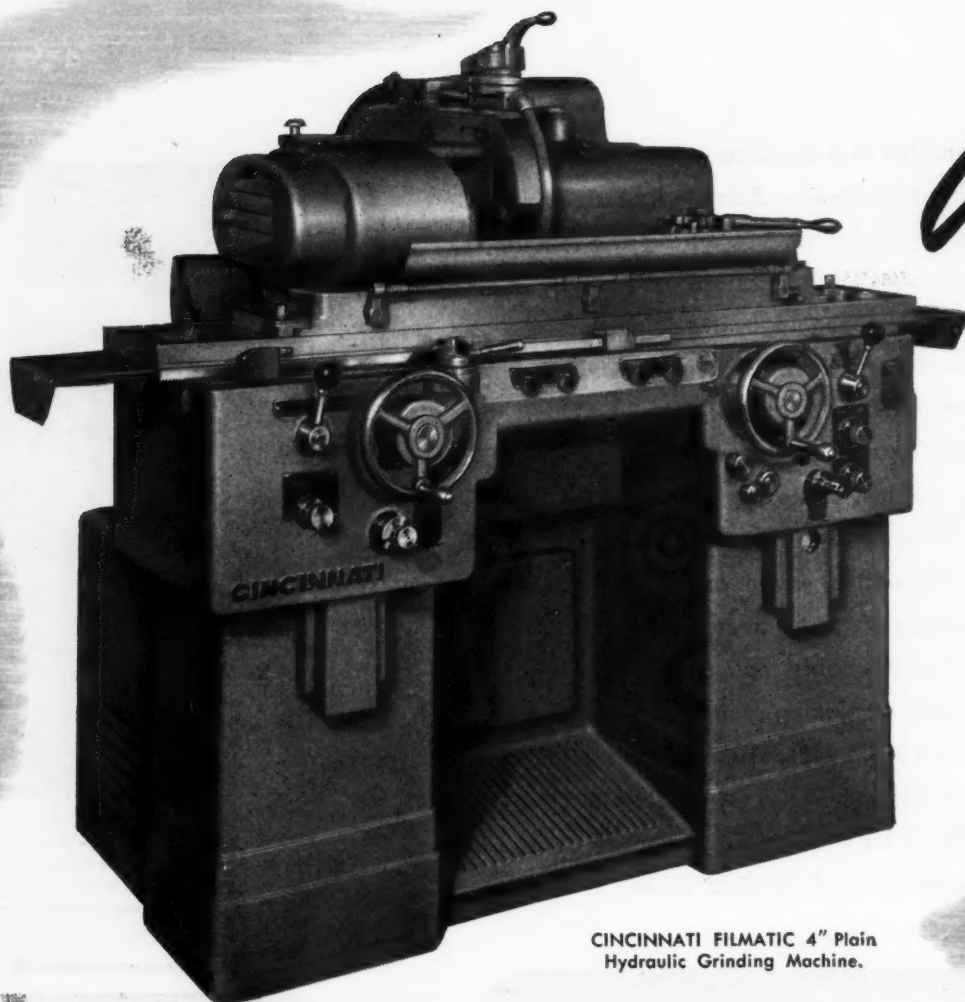
CINCINNATI No. 2 MI Plain Milling Machine. Catalog M-1506 contains complete information. Brief specifications will be found in Sweet's Catalog File.

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S.

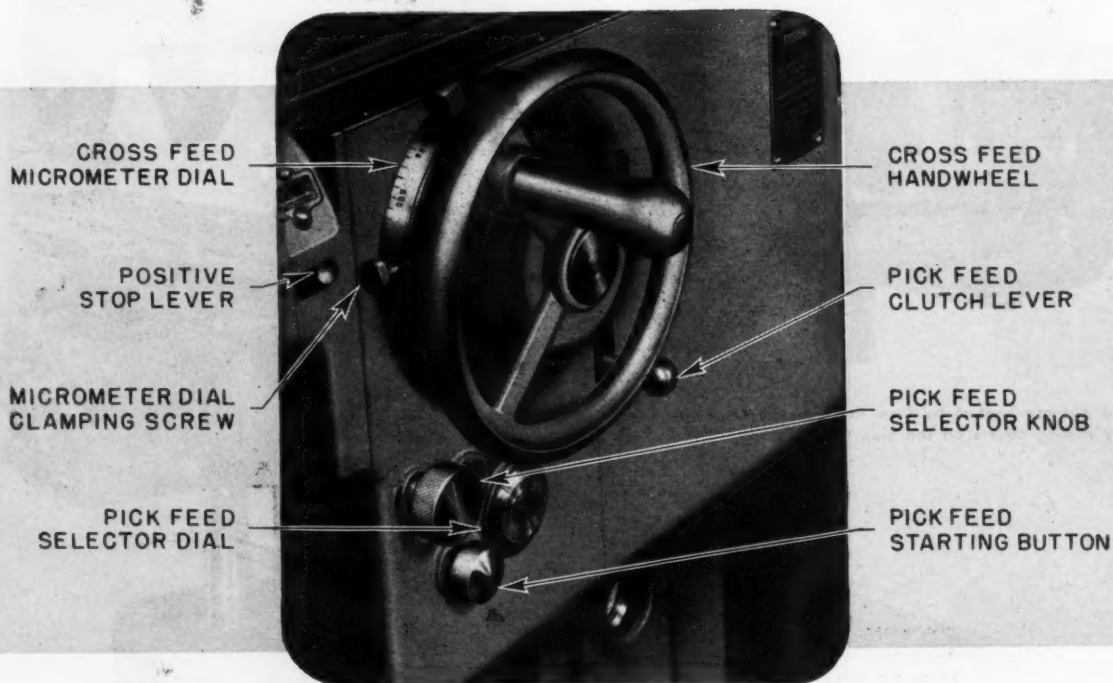
BROACHING MACHINES

CUTTER SHARPENING MACHINES

Weld



CINCINNATI FILMATIC 4" Plain
Hydraulic Grinding Machine.



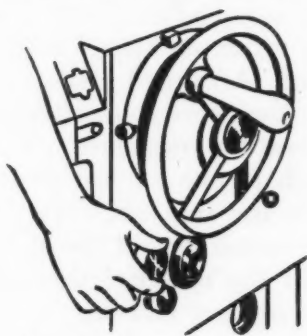
CINCINNATI

CENTER TYPE GRINDING MACHINES

like to PUT ACROSS to you— this CROSS FEED arrangement

Every grinding man knows that many factors contribute to the accuracy of a grinding machine. But he also knows that the one deserving top billing is the cross feed mechanism because there are so many elements involved—power transmission parts; the coarse and fine adjustment of the handwheel; the pick feed; the bearing between the bed and wheelhead; and the positive stop for sizing. ¶In the CINCINNATI FILMATIC 4" Plain Hydraulic Grinder, all these elements are made as accurately as men, machines and

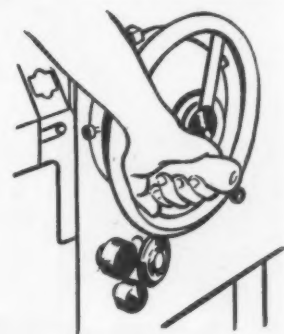
methods can produce them. And in addition, the design of this unit offers unusual convenience, ease of operation and setup. ¶Take a look at the features illustrated below and then ask yourself if they would speed up production of your small, precision ground parts within the range of the machine. And remember, too, that the new 4" Grinder is equipped with FILMATIC bearings. ¶Complete engineering specifications on this precision, small part production grinder may be obtained by writing for catalog G-520.



Selecting the rate of metal removal per pass is as easy as tuning in a radio. Rate is indicated on an easily read pick feed dial.



To start the pick feed cycle, merely bump the conveniently located pick feed starting button with the palm or heel of the hand. It's as easy as that.



Correction for wheel wear. Adjusting handwheel from one notch to the next (on dial behind handwheel) reduces the work diameter .0001".

GRINDERS INCORPORATED

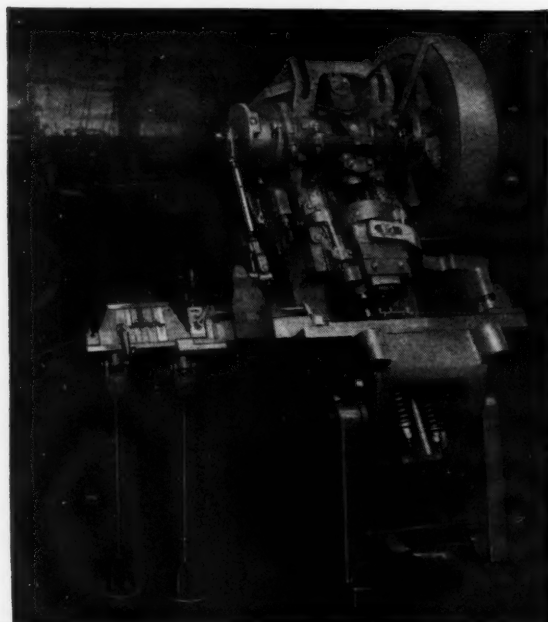
CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

REDUCE LABOR AND TOOL MAINTENANCE COSTS — INCREASE PRODUCTION



Of major importance, today, to all manufacturers is the finding of ways and means to reduce labor cost and, at the same time, increase production. Where punch press operations are involved the line of U. S. Automatic Press Room Equipment serves this dual purpose. Automatic Feeds, in addition to effecting a labor saving, also bring about important increases in production.



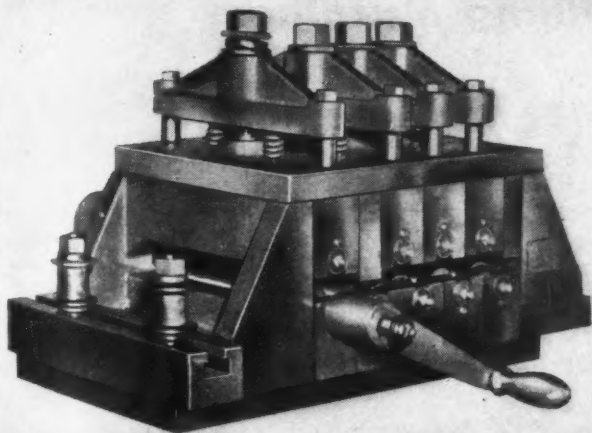
Our Customers have informed us that the use of U. S. Slide Feeds for feeding coil stock into punch presses has brought about an increase in production in some cases up to 300%. This, going hand in hand with the reduced labor cost and reduced cost for tool and die upkeep, constitutes an all 'round saving which can make the difference between an unsuccessful and a successful operation.

The illustration directly to the left shows a set-up of Slide Feed, Roller Check and Stock Straightener mounted on a conventional punch press. Arranged with this type of equipment the press is an entirely automatically operating machine. The Slide Feed, at each stroke of the press, automatically feeds the material forward to the exact length required. At the same time the Feed pulls the material through the Straightener to remove coil set.

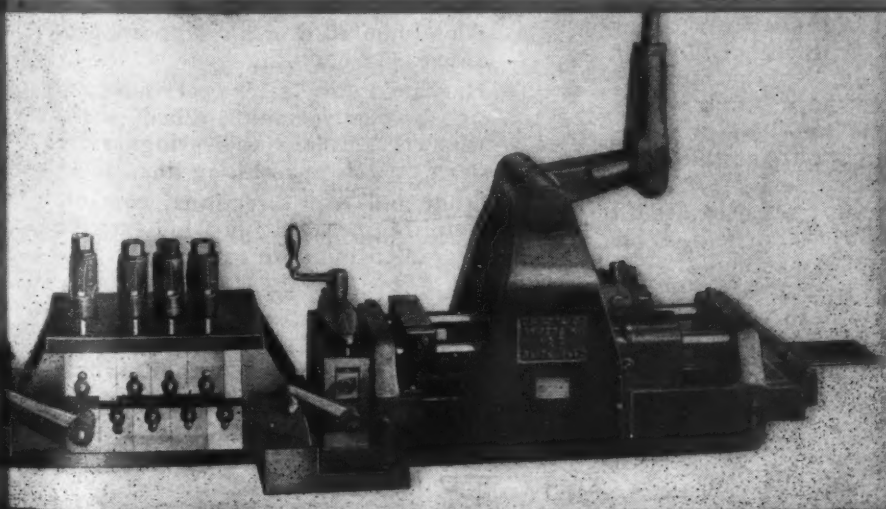
Bulletin No. 50 contains illustrations and descriptions of the U. S. Slide Feeds, Roll Feeds, Stock Straighteners, Stock Reels, Coil Cradles and Stock Oilers. If you are now using punch presses in your plant, write for your copy of Bulletin No. 50.

U. S. TOOL COMPANY, INC.

install U. S. Automatic Press Room Equipment!



TOP: The top illustration on the left hand page shows the No. SF-1 Slide Feed equipped with Roller Check. The Model No. 1 Slide Feed can accommodate material up to 2½" in width and provide a maximum feed length of 4". The Slide Feeds are made in a range of sizes to accommodate various widths and various feed lengths. CENTER: The illustration to the left shows one of the U. S. Plain Stock Straighteners. These units are designed for use in conjunction with the Slide Feeds for removing coil set. The Straighteners are also made in a range of sizes to accommodate various widths of material.



LEFT: The photograph to the left shows a typical setup of U. S. Slide Feed, Roller Check and Stock Straightener. The Slide Feed is so designed that it has power enough to pull material through a Plain Stock Straightener. This is a decided advantage inasmuch as it eliminates, in many cases, the use of an expensive Power Driven Straightener.

AMPERE (East Orange), N. J. Builders of U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories — U. S. Multi Millers — U. S. Multi Slides

Announcing...

...The NEW
VAN NORMAN No. 22M
Ram-Type Milling Machines

★
Featuring Greater Vertical Range

- ★ ADJUSTABLE CUTTERHEAD PERMITS HORIZONTAL, VERTICAL, ANGULAR MILLING.
- ★ MOVABLE RAM PROVIDES MAXIMUM CAPACITY AND VERSATILITY.
- ★ FRONT AND REAR POWER CONTROLS FOR EASE OF OPERATION.

The new Van Norman No. 22M is specifically designed for those applications where greater clearance between cutterhead and lowest position of table is desired. This feature is especially important in pattern shops, tool rooms, laboratories, die and mold shops where the greater vertical capacity permits milling on a wider range of work.

The Van Norman No. 22M provides the following outstanding construction advantages —

- Greater vertical range.
- Adjustable cutterhead permits conventional horizontal and vertical, as well as angular milling.
- New heavier cutterhead plus new

spindle transmission provides greater load-carrying capacity.

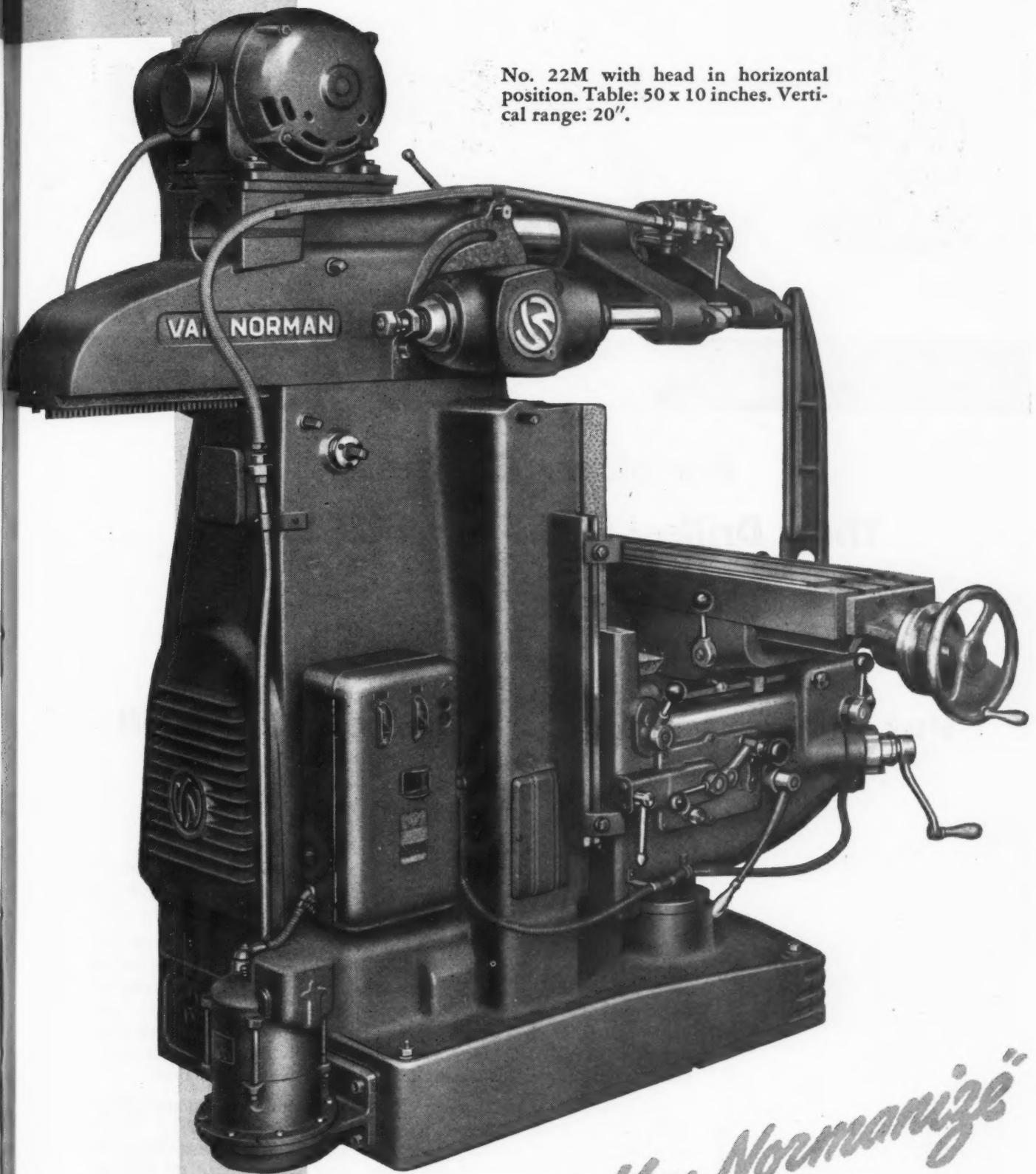
- Aluminum alloy arbor supports provide easier handling.
- Hardened alloy steel gears mounted on hardened multi-splined shafts rotate on anti-friction bearings assure quiet operation and long life.
- Front and rear directional controls simplify operation, provide extreme convenience of control.

Investigate the new Van Norman No. 22M today. Find out how this outstanding machine increases production, cuts milling costs on a wide variety of applications. Available with plain or universal saddle.



VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS

No. 22M with head in horizontal position. Table: 50 x 10 inches. Vertical range: 20".

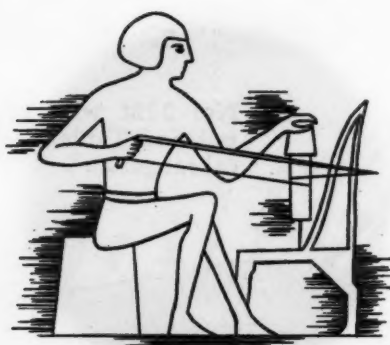


"It pays to Van Normanize"

"THE STORY OF THE TWIST DRILL IS THE STORY OF MORSE"



Aborigine with Shaft Drill



Egyptian with Bow Drill

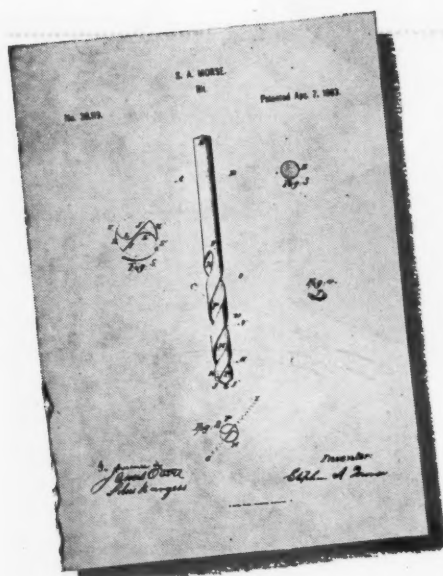


Chinaman with Pump Drill

**For Many Centuries
They Drilled It the "HARD WAY"
...until**

STEPHEN A. MORSE

Put his New Twist onto the old flat Drill



Signed and witnessed patent drawing of first Morse Twist Drill.

It was a long way from the aboriginal drill to the original Morse Twist Drill. All the way from a prehistoric cave to Bridgewater, Massachusetts . . . where Steve Morse patented his invention in 1863.

At first, all Morse Twist Drills were carbon steel, hand-cleared. Then high-speed steels were tried . . . *and forged* . . . and the Morse Drill won new users by the thousands. Meanwhile, groove-area and twist-cut angle were changed to step up speeds and feeds . . . and drills with oil-holes were developed for deep drilling. Next came cobalt steel drills for hard materials . . . drills tipped with tungsten carbide . . . and drills specially treated for abrasion resistance.

Then, as Morse development sped ahead, came standard and special drills for hard rubber, slate, plastics, brass, steel (including manganese) light metals, wood, paper. Today, whatever your drilling job, you can get exactly the Morse Twist Drill you need to do that job with highest speed and accuracy, at lowest cost. Ask your Industrial Supply Distributor, *now*, to get you a Morse specification . . . and count yourself in on all the benefits of Morse's steady advance in twist-drill development.



Workman of 1862
with Flat Drill



In only 83 years (from the time of the old flat drill) Morse development has ranged from the patenting of the milled twist drill to the modern, high-precision, long-lived High-Speed Drill.

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

MORSE TWIST DRILL
& MACHINE
COMPANY

The Original Manufacturer of Twist Drills

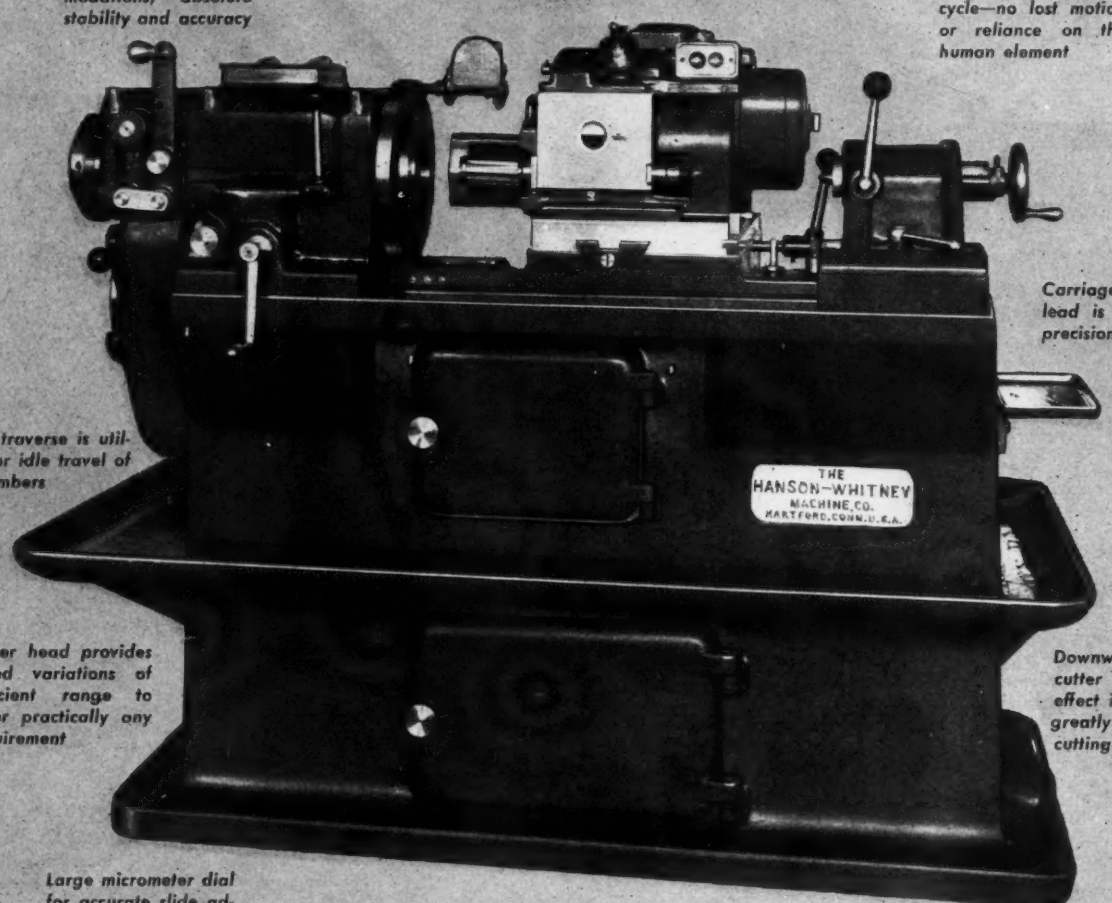
NEW BEDFORD, MASSACHUSETTS



NEW YORK STORE: 130 LAFAYETTE ST. • CHICAGO STORE: 570 WEST RANDOLPH ST. • SAN FRANCISCO STORE: 1180 FOLSOM ST.

MACHINERY, December, 1946—17

YEARS OF SEVERE SERVICE



Work head provides unusual work accommodations, absolute stability and accuracy

Work head and cutter head operated by separate motors

Automatic operating cycle—no lost motion or reliance on the human element

Rapid traverse is utilized for idle travel of all members

Carriage travel for lead is governed by precision cam

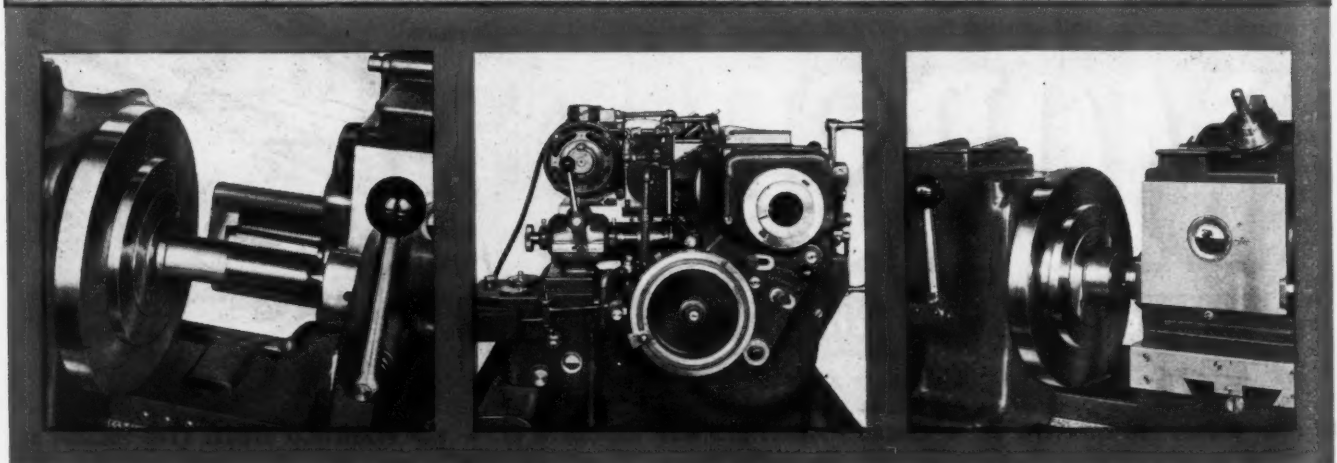
Cutter head provides speed variations of sufficient range to cover practically any requirement

Downward pressure of cutter and fly wheel effect in gearing add greatly to stability and cutting action

Large micrometer dial for accurate slide adjustment control located directly in front of operator

Extra heavy bed construction for stability

Automatic lubrication



E HAVE TEST-PROVED THESE MACHINES

FOR FAST ACCURATE THREAD CUTTING



Consider these advantages:

1. Suited for external or internal threads, right or left hand. 2. Taper threads are produced as accurately as straight threads. 3. Threads irrespective of length are finished in one revolution of work (within the capacity of the machine). 4. Work held on centers or directly in spindle by quick acting collet mechanism (manual or air). 5. Set-up requirements are very simple, can be accomplished in a few minutes.

Hanson-Whitney Thread Milling Machines have proved their worth year after year . . . by producing perfect threads in quantity . . . at less cost.

Think of the big savings you can realize when you have one machine that will cut external or internal threads, right or left-handed, straight or tapered . . . automatically.

The simplicity of design in Hanson-Whitney Thread Millers means less set-up time . . . lower equipment costs . . . smaller floor space and fewer man hours. Such savings may well make the difference between profit and loss in these days of rising production costs.

Hanson-Whitney engineers can help you to gain a better competitive position by improving your thread milling production and cutting your costs. For further information write: **Hanson-Whitney Machine Company, Hartford, Connecticut.**

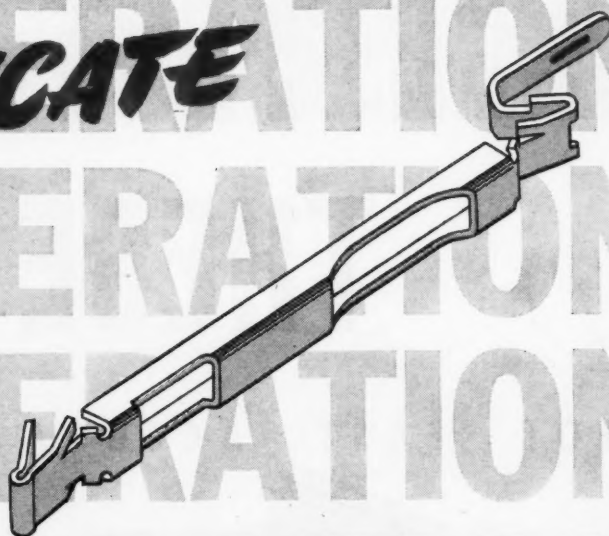
Hand it to

Hanson Whitney

M A C H I N E C O M P A N Y
H A R T F O R D • C O N N E C T I C U T

MACHINERY, December, 1946—19

ONE OPERATION **THIS INTRICATE PART MADE IN** ONE OPERATION



This part made for General Electric Co. ➔



The cost of this part to our customers is approximately 1/3 of what it would be if made in conventional power presses. Less intricate parts are also being made today at less cost in our fully-equipped multislide production department.

Take advantage, as others have done, of our investment in these time-saving machines.

*Send your inquiries to:
George E. Tilp, General Manager*



ADAMS STAMPING CORP.

Organized to solve your Stamping Problems

314-328 ADAMS STREET

Established 1924

NEWARK 5, N. J.

Interested in Adding 50% to Cutter Life?

Because it is a radically different kind of cutting fluid . . . a chemical emulsion which combines cooling capacity and friction reduction in a degree never before attained . . . Cimcool has produced amazing increases in tool life in plant after plant. May we demonstrate what it will do in YOUR plant?

Other CIMCOOL Advantages

- Uniform work temperature increases accuracy.
- No fire hazard—No smoke—No slippery film.
- Faster cooling allows faster cutting.
- Non-irritating—Doesn't grow rancid.
- Covers 85% of all metal working jobs.
- Contains long-lasting rust inhibitor.

Cutter life increased at least 50% says Thompson Industries, Inc. of Long Island City, N. Y.

Here's what the company writes about Cimcool: "In our grinding operation our wheels do not load up so rapidly thereby increasing wheel life and giving a better finish on the work. Also, in our hobbing machines, cutter life has been increased at least 50% between sharpening."

CIMCOOL DIVISION OF
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

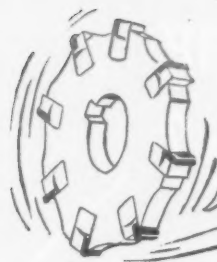


CIMCOOL

Reg. U. S. Pat. Off.

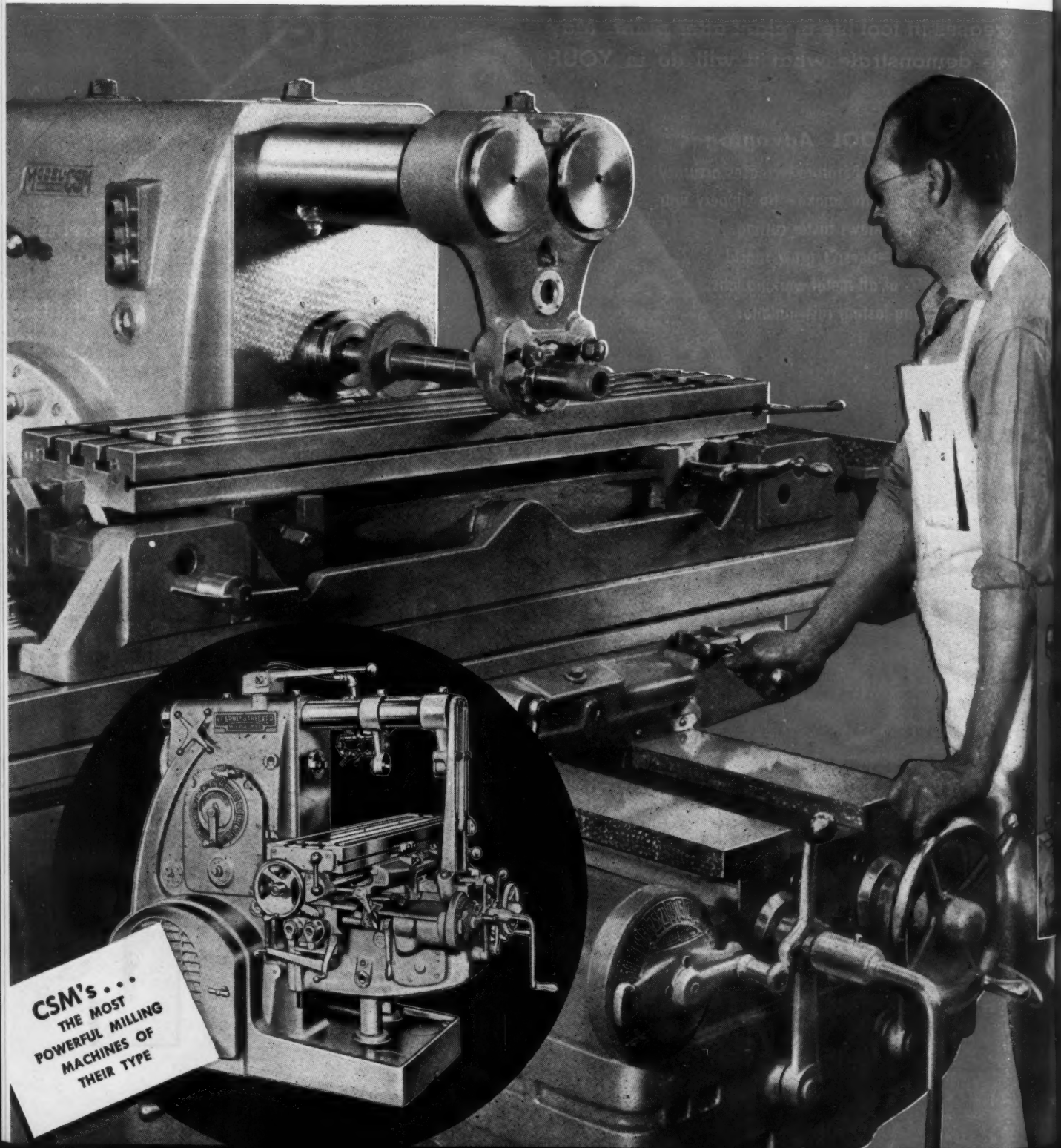
THE MULTI-PURPOSE CUTTING FLUID

**MILLING
CAST
IRON**



BUT

on a Standard



**CSM's . . .
THE MOST
POWERFUL MILLING
MACHINES OF
THEIR TYPE**

Ke
the
and
On
fix
and
thr
Th

C
V
M
C
C
T
D
M

O
Wo
An
Ma

FAST!

Kearney & Trecker CSM

Kearney & Trecker CSM's are expressly designed for the most efficient use of Carbide Cutters on ferrous and non-ferrous metals.

On this job, because of the size of the workpiece and fixture — we selected a 50 h.p. CSM plain model — and equipped with the proper cutter, it zipped through the cast iron workpiece easily and speedily. The details of the operation are given below:

OPERATION: Mill coolant trough
WORK PIECE: Milling machine table
MATERIAL: Close-grain, high tensile cast iron
CUTTER: 6" dia., 10 tooth, carbide tipped slotting
CUTTER SPEED: 180 RPM
TABLE FEED: 21 IPM
DEPTH OF CUT: $\frac{3}{4}$ " to $1\frac{3}{4}$ " ($\frac{3}{32}$ "— $\frac{1}{4}$ " each side)
METAL REMOVAL RATE: 15 cu. in. per minute at maximum depth of cut.

NOTE the special fixture which provides maximum rigidity coupled with quick change set-ups on the workpiece and especially facilitates the loading and unloading of the workpiece on the machine.

CSM Milling Machines were designed to obtain the greatest benefits from modern cutting tools, and are part of our line of standard models. The design has been developed after complete analyses of problems of milling with carbide cutters. Machines available in 20, 30 or 50 h.p. models in plain and vertical knee types.



Write for complete data on CSM machines — CATALOG CSM-20. Please indicate your business connection.

Operation 1 . . .

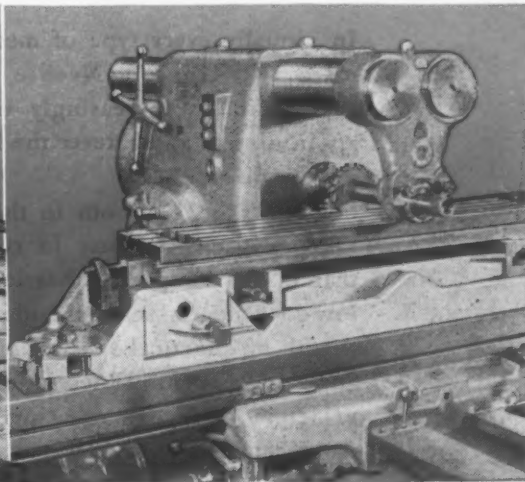
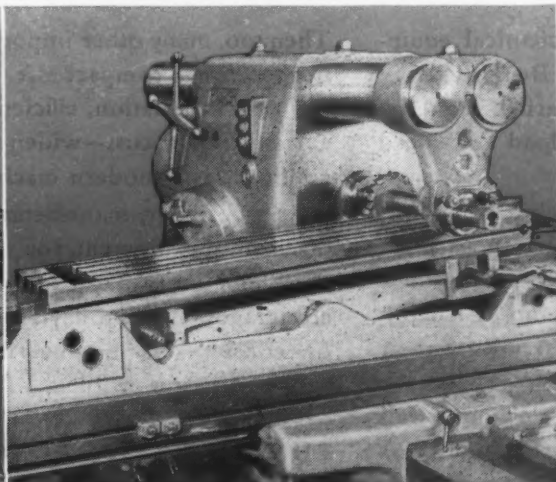
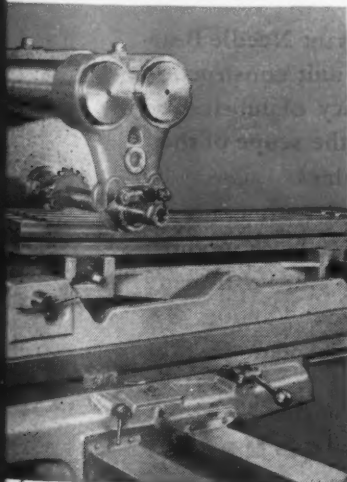
Workpiece tilted to right in fixture. Angular coolant channel is climb milled. Maximum depth of cut: $1\frac{3}{4}$ ".

Operation 2 . . .

Workpiece tilted to left in fixture. Angular coolant channel conventional milled. Maximum depth of cut: $1\frac{3}{4}$ ".

Operation 3 . . .

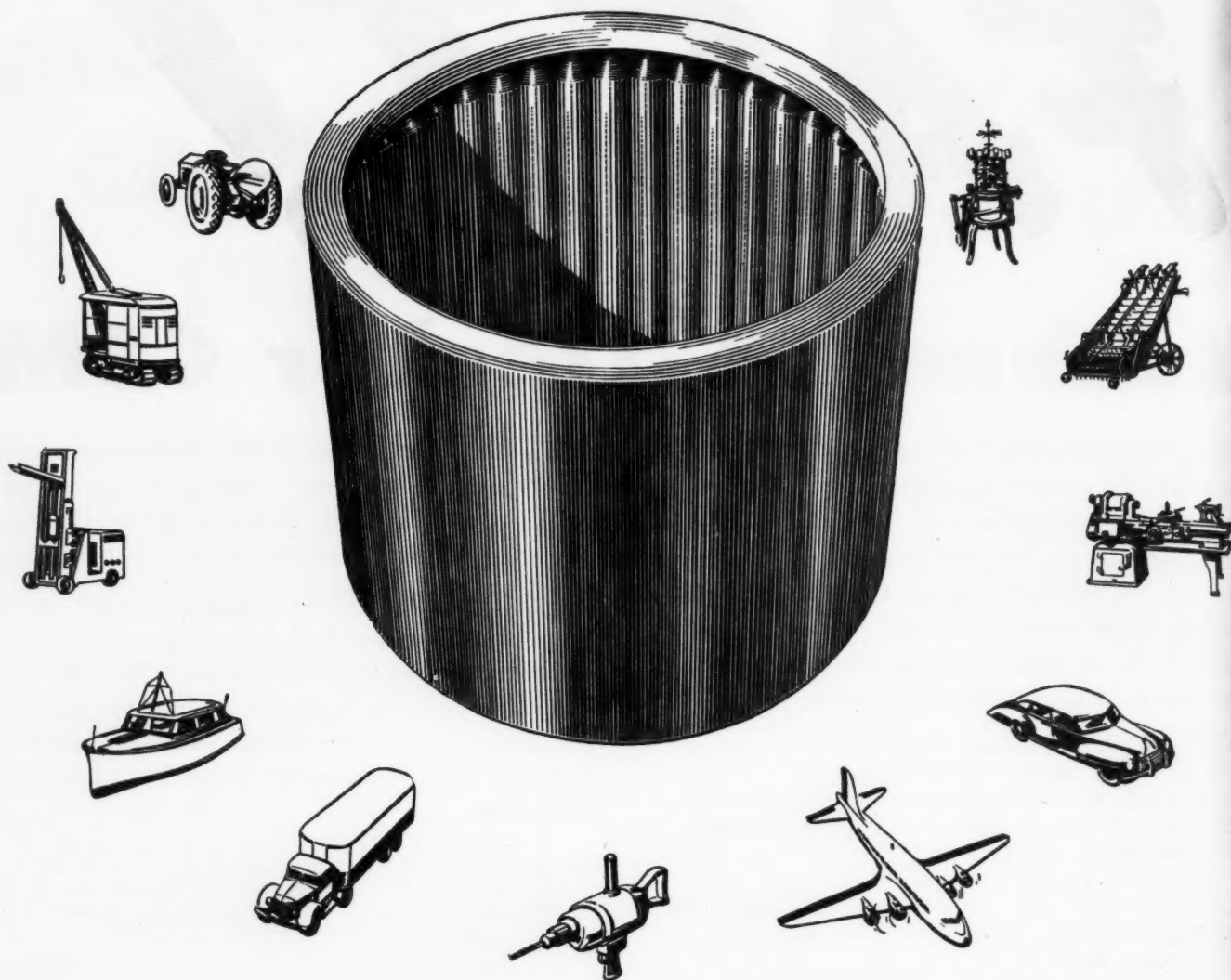
Workpiece held in horizontal position in fixture. The two angular channels now blended by climb milling.



KEARNEY & TRECKER CORPORATION

MILWAUKEE 14, WISCONSIN

BE READY FOR TOMORROW . . . WITH CSM'S



It has an ever widening circle of application

In virtually every type of mechanical equipment, Torrington Needle Bearings are serving in an increasingly varied range of applications . . . whatever the load and speed requirements.

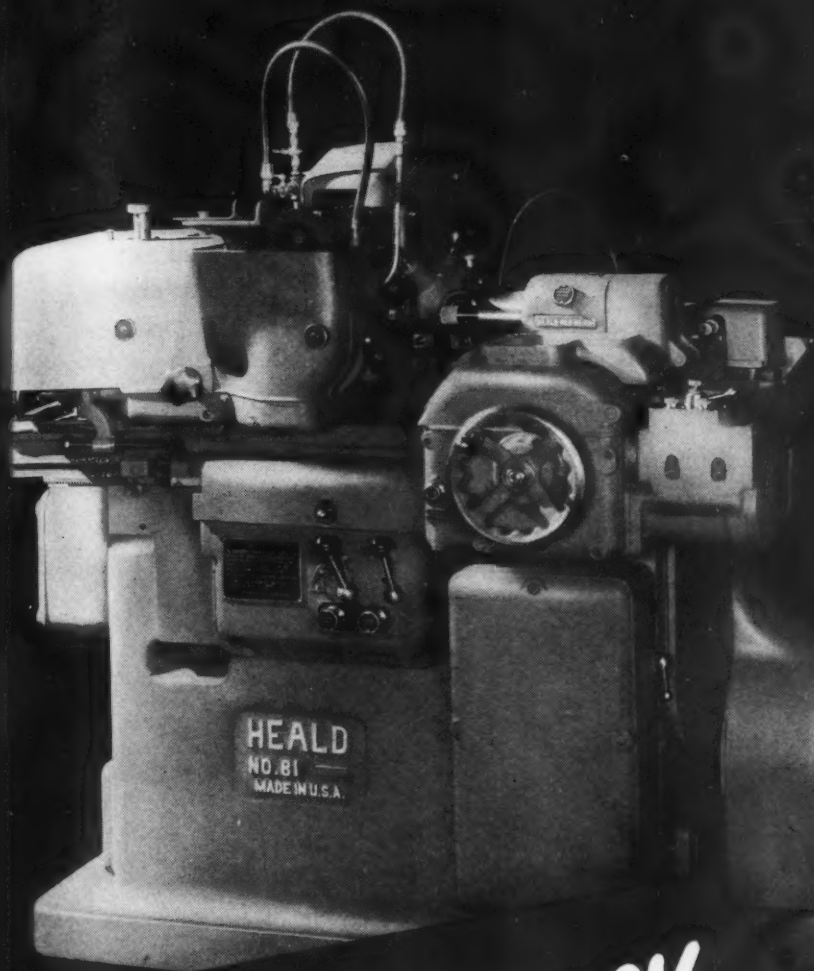
The reason lies both in their tremendous radial capacity—greater in relation to O.D. than in any comparable bearing—and in their low coefficient of starting and running friction—with no practical speed limitation on their application. Behind these advantages lies the principle of Needle Bearing design—a full complement of small diameter precision rollers which provide maximum area of bearing contact surface.

Then too, many other important Needle Bearing features—compact size, unit construction for easy installation, efficiency of lubrication and low initial cost—widen the scope of their application to modern machines.

As a designer, manufacturer or operator of mechanical equipment, you should know about these and other Torrington Needle Bearing advantages. Write today for our Catalog #32, or consult our Engineering Staff on any specific friction problem.

THE TORRINGTON COMPANY
TORRINGTON, CONN. SOUTH BEND 21, IND.
Offices in All Principal Cities

TORRINGTON NEEDLE BEARINGS



**EVEN
ACCURACY
IS AUTOMATIC**

JUST FILL the loading chute, and the Heald No. 81 Centerless does all the rest *automatically*—loading, rough and finish grinding, wheel truing, size-control, ejection—in one continuous cycle. That's why this Heald Centerless is the *only* completely automatic grinding machine. One operator—even an unskilled mechanic—can handle as many as six machines at one time... do it in faster preset cycles, under less strain and fatigue.

Accuracy, too, is automatic. Perfect concentricity is assured by a unique method of generating the bore from the outside diameter of the part itself. Instead of using a chuck, the work is held between three rolls in the Centerless workhead. And any type of hole can be sized to tolerances of tenths-of-thousandths—without extra gaging—by either Size-Matic or Gage-Matic controls.

Very likely you have a job that could

be handled *automatically* on the Heald No. 81 Centerless—for more productive, more economical results. Write for full information to: THE HEALD MACHINE COMPANY, Worcester 6, Mass.

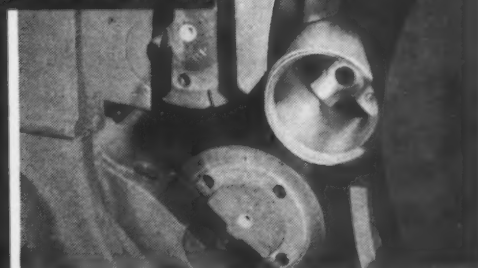
HEALD

*means more precision
... less cost*

**AUTOMATIC
LOADING**



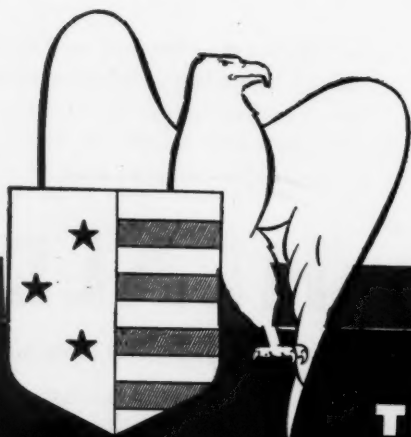
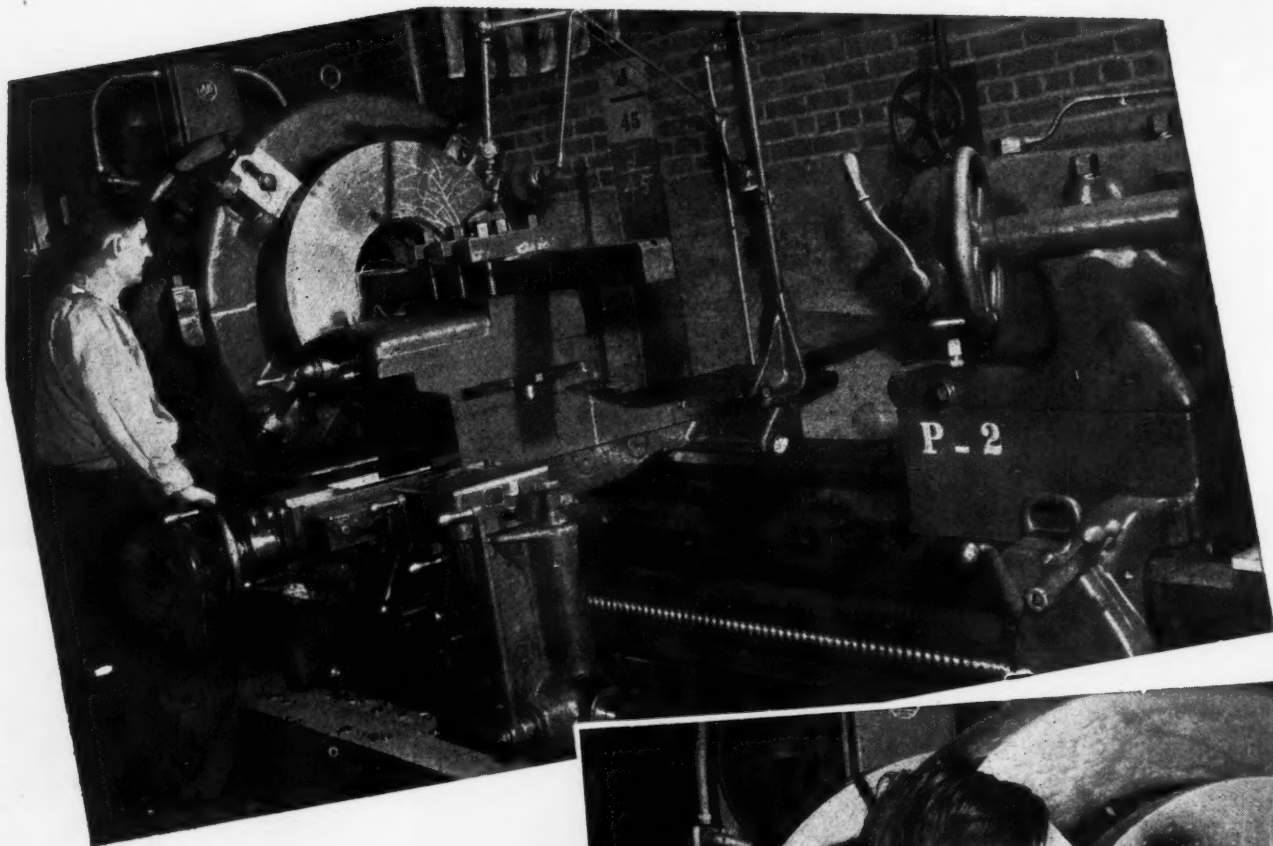
**AUTOMATIC
SIZING**



**AUTOMATIC
CYCLES**



Like all True



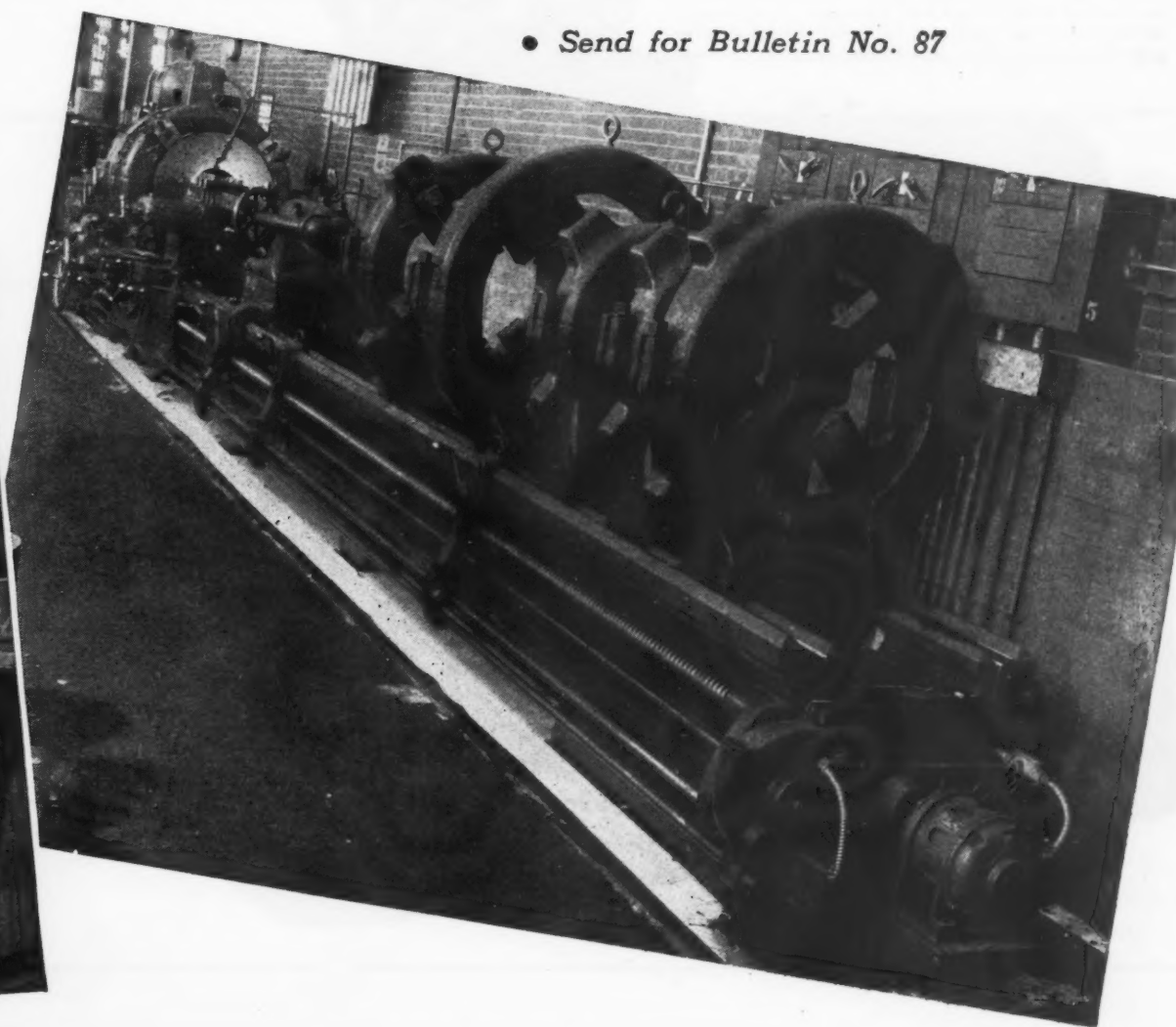
THE AMERICAN TOOL WORKS CO

e AMERICANS...

"AMERICAN" Lathes, from the smallest to the largest, are meeting the challenge of production like all true Americans. The power, stamina and endurance built into "American" Lathes have proven invaluable to many a production plant operating on an around-the-clock schedule. Dependable service, minimum shut-down for failures and repairs, coupled with an almost unbelievable ability to "keep going" under any and all conditions, are genuine "American" characteristics. "American" Lathes are easy to operate, too—another feature that appeals to the operator as do their simplicity of design and complete freedom from complex mechanisms and manipulations.

"American" Lathes are an asset in any plant.

• Send for Bulletin No. 87



co *Lathes and Radial Drills* Cincinnati, Ohio U.S.A.

POWDERED METAL THREADING PROBLEM

Centerless Thread Grinder—For grinding fine pitch threads from the solid in a single pass. High production to well within Class 3 fit. Separate built-in motor driven thread crusher and hydraulic wheel dresser give flexibility and minimum down time.



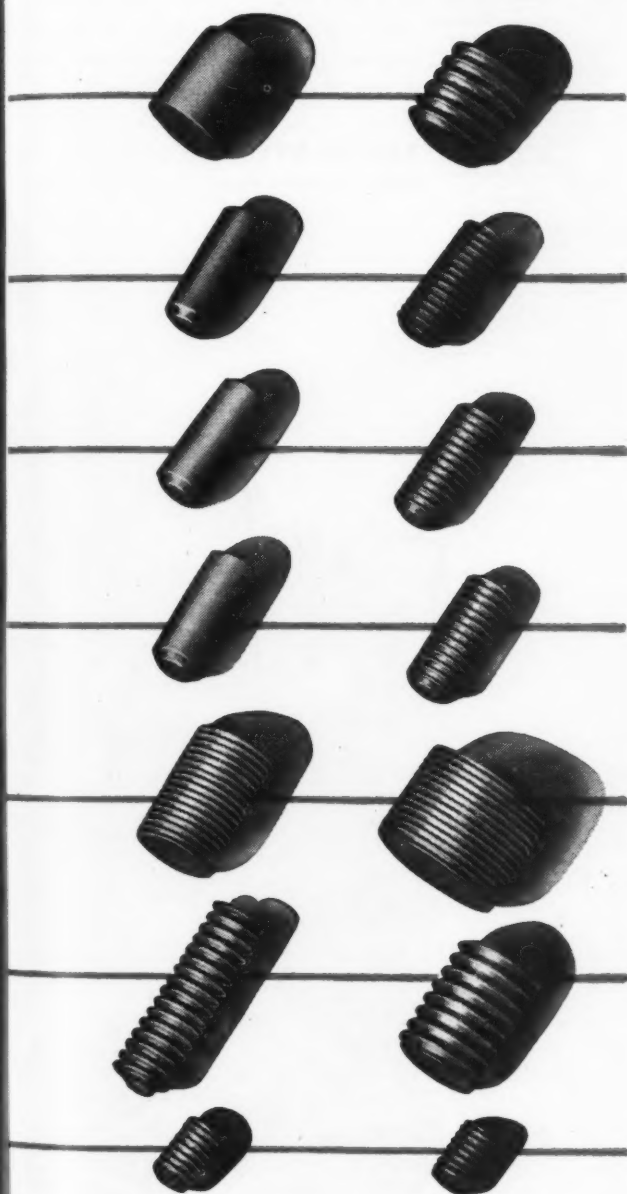
LANDIS TOOL
Precision Grinders



LANDIS TOOL COMPANY

SOLVED BY CENTERLESS THREAD GRINDER

SPOT CHECK REPLACES TWO 100% INSPECTIONS



Powdered metal blanks and threaded parts produced on Landis Tool Centerless Thread Grinder. Range of sizes illustrated #10-32, $\frac{1}{4}$ "-28, $\frac{1}{4}$ "-20, $\frac{3}{8}$ "-32, $\frac{3}{8}$ "-16, $\frac{7}{8}$ "-32.

WAYNESBORO, PA.

Manufacturers of powdered metal parts had a production threading problem. Large production was needed with uniform electrical characteristics and good thread form.

Previous production methods caused crumbling of the metal and frequently produced changes in the electrical characteristics. This required two inspections—one for thread form and one for electrical characteristics—both 100%. The result, with rejections running high, was high cost production.

With the Landis Tool Centerless Thread Grinder only spot checking is necessary for thread form. Rejects have been practically eliminated and the multiple groove grinding wheel has practically unlimited life for long production runs. On one production run over 600,000 screws #10-32 x $\frac{1}{4}$ were ground from powdered metal blanks at the rate of 120-130 per minute and the thread form in the wheel still did not require recrushing.

Electrical inspection was eliminated by centerless thread grinding, thereby saving inspection time and rejects. After finished screws on an initial setup are found to meet the required electrical characteristics, all others meet the same standards.

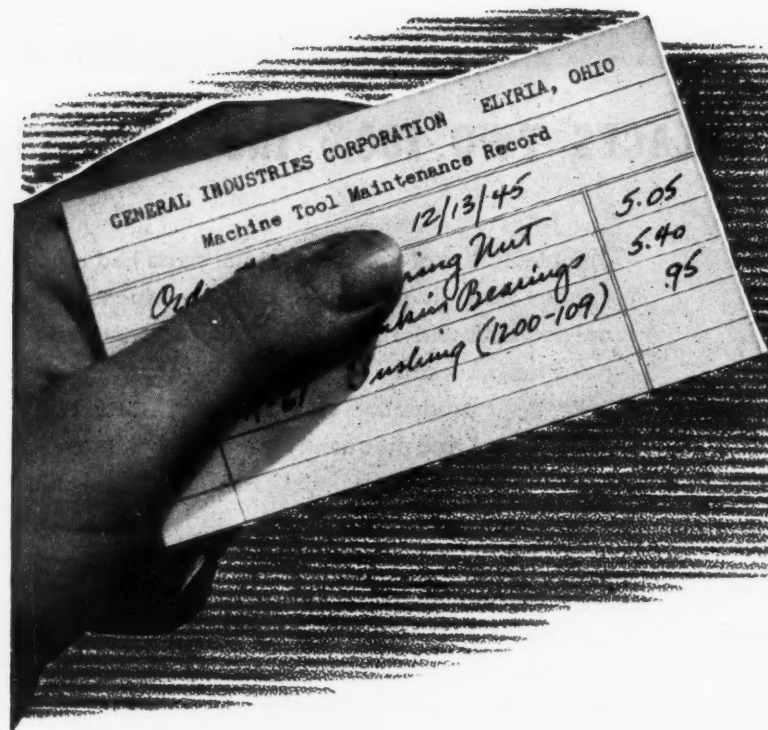
Landis Tool Centerless Thread Grinders can meet a wide variety of thread grinding problems—high production, true thread form, accurate fits, fine finish. Write for descriptive bulletin or send details of your thread grinding problem for a recommendation.

45

LANDIS TOOL

Company

Total maintenance cost for 7



THE MACHINE: A Warner & Swasey No. 3 Universal Turret Lathe.

ITS SERVICE: 7 years continuous operation with 5 consecutive years on a 3-shift basis and the balance on 2 shifts... equivalent to over 19 years of single-shift operation.

THE JOBS: Turning plastic parts that require diamond tipped and carbide cutters.

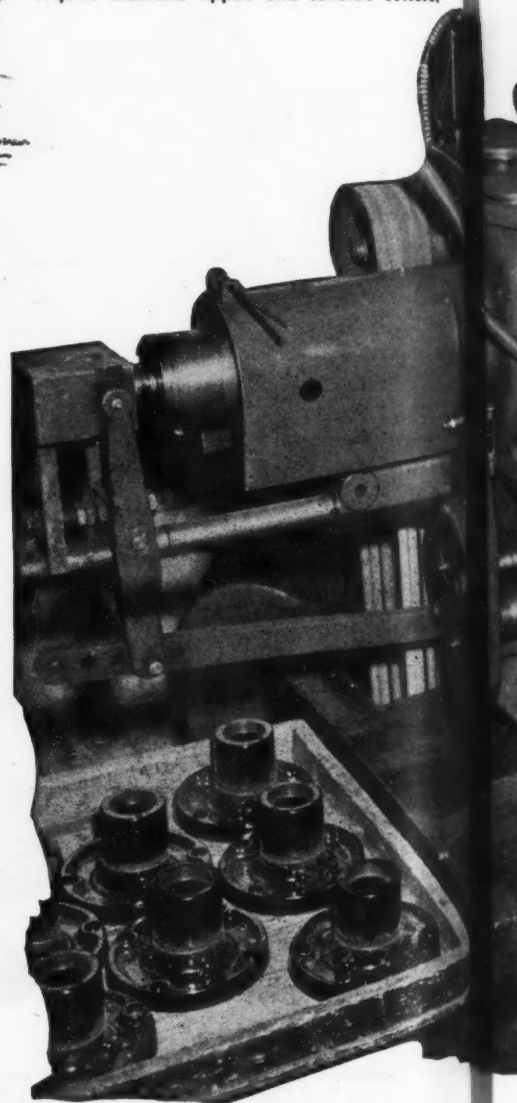
THIS low-cost maintenance record was made on a No. 3 Warner & Swasey at the General Industries Corporation, Elyria, Ohio.

The parts being turned go into machines used by the Industrial Rayon Corporation, Cleveland. They are machined to close limits with the turret lathe operating at 1480 r.p.m. When assembled, these parts run in acid—they are made of hard plastic—metal is impractical. High speed steel cutters dull too quickly, so diamond and carbide cutters are needed.

The lathe bed is piled up with gritty powder. No coolant can be used for

flushing. An air hose blast is used after each chucking but plastic dust settles on all parts of the machine. The abrasive action of this fine powder penetrates into all working surfaces and bearing mountings making operating conditions unusually severe.

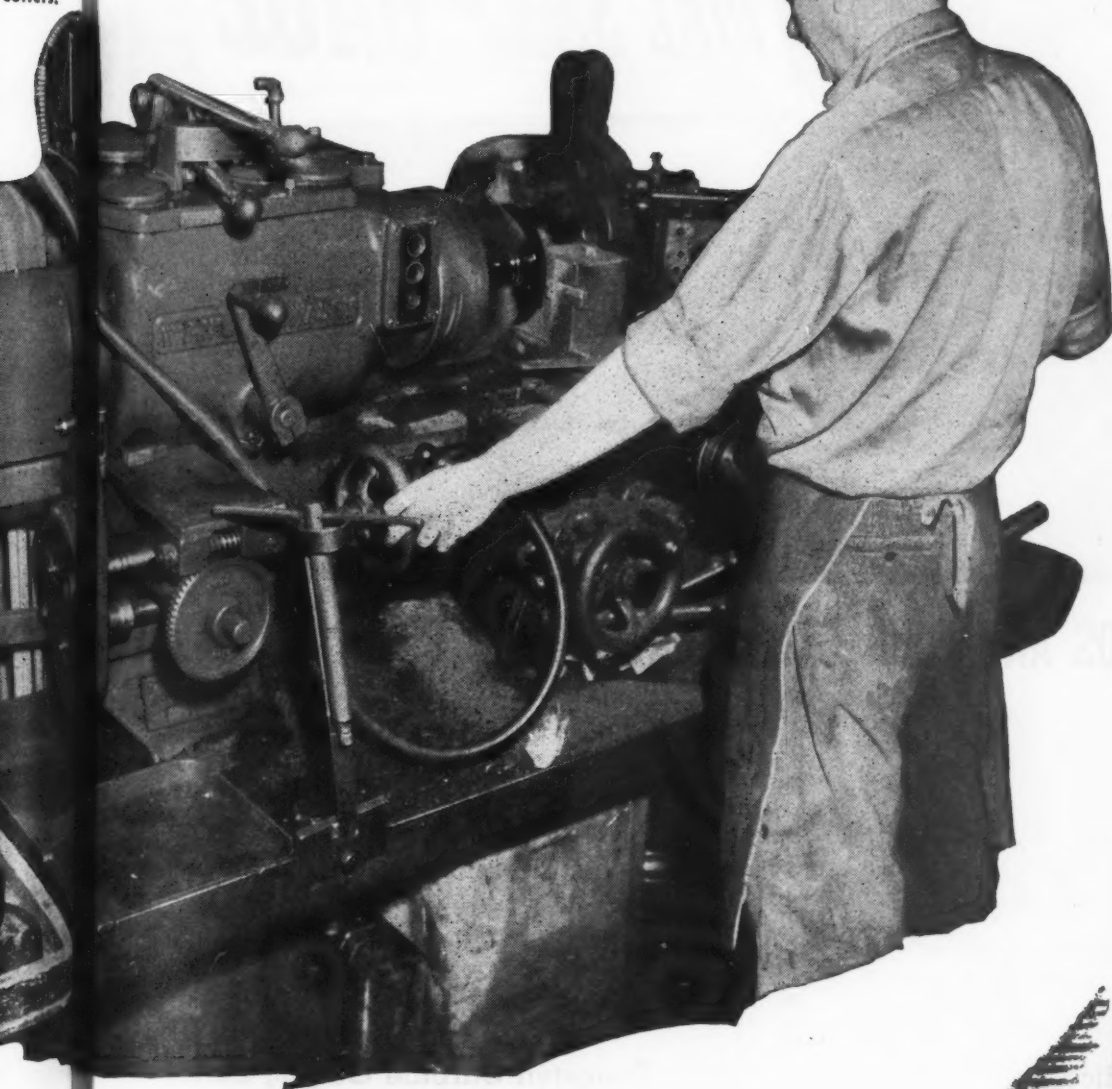
In the face of this high-speed, severe test, General Industries' costs for repair parts have been only \$11.40 during the past 7 years when over 19 years of single-shift operation were put on this machine... another example of the accuracy, stamina, and low maintenance costs of Warner & Swasey Turret Lathes.



TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

or 7 years... *only* \$1140

The job being run here is a facing, boring and turning operation on a hard plastic work piece with bore held to .002 and .004 in turning. Five diamond tipped tools and two carbide cutters are used in the operation which is completed in one chucking. A special back-boring attachment, designed by Warner & Swasey, eliminates a second chucking by permitting a back-boring operation to be completed through the spindle.



**WARNER
&
SWASEY**
Machine Tools
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS... WITH A WARNER & SWASEY

MACHINERY, December, 1946—31

FOUR GAGES IN ONE

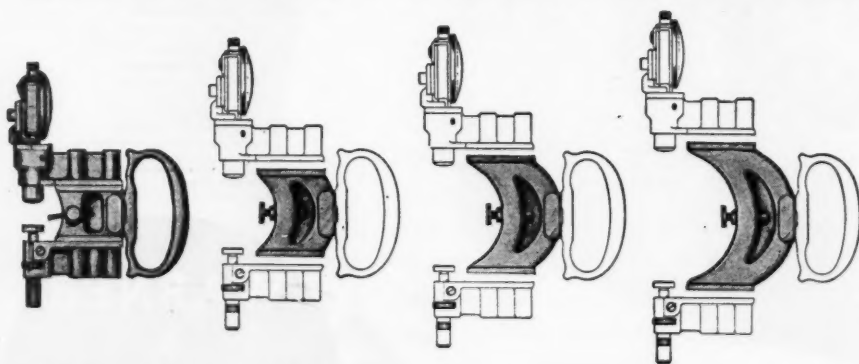


STANDARD

Decimatic
DIAL SNAP GAGE

Patents Pending

ONE PAIR OF HEADS AND FOUR EXTENSION SPACERS COVER 4" RANGE



SET, consisting of a pair of heads and four interchangeable extension spacers, effects marked saving in cost. Sets available for either 0 to 4" or 4" to 8" range.

Full Size Decimatic Indicator

Easily Set to Blocks or Master

Graduated in "Tenths"—Accurate to "Split-Tenths"

Tungsten Carbide Gaging Surfaces

Highly Consistent Repeatability

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

**NO, NO,
NOT THAT WAY!**



You can get the right cutting oil answers from us

WHEN YOU WANT to get the right finish or good tool life on some new operation... and you've tried every likely cutting oil but none of them does the trick... why not unload your problems onto a Standard Oil Cutting Oil Specialist? He's quick with answers... *right* with answers!

If your plant is located in the Midwest there is one of these cutting oil specialists at the nearest Standard Oil office ready to study your cutting oil

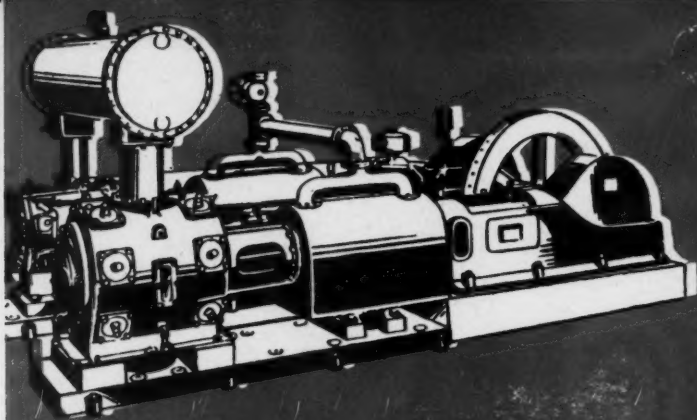
needs. There are two sound reasons why he can help you. First, he has complete knowledge of products developed by Standard Oil for practically all machine operations. Second, he has experience in applying these products in many other plants.

You'll find Standard's Cutting Oil Service the real short cut to your cutting oil needs. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

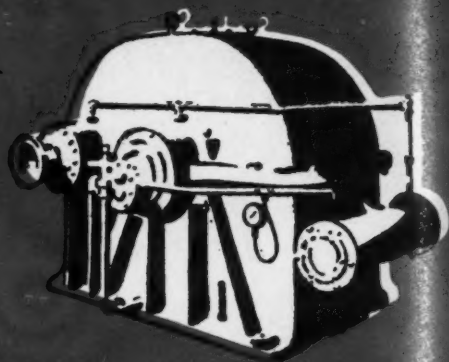
**Standard's
CUTTING OIL
SERVICE**

STANDARD OIL COMPANY (INDIANA)

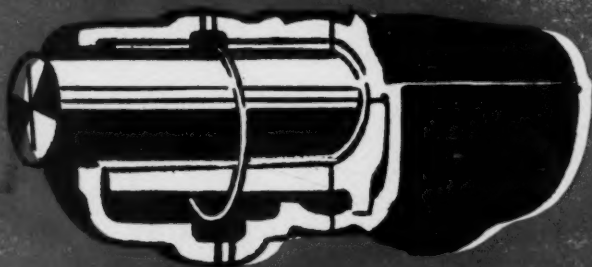
**STANDARD
SERVICE**



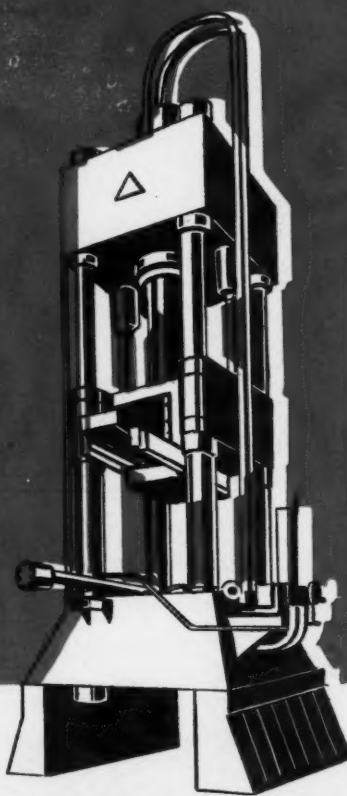
Less deposits in compressors because the improved oxidation stability of Stanoil resists heat... the low carbon forming base oil in Stanoil helps keep valves free from carbon.



Fewer oil changes in gear cases because the inhibitor in Stanoil prevents excessive acidity and deposit formation over long periods of operation.



Low bearing wear because of Stanoil's high lubricating quality and because its high viscosity index assures a free flow of the lubricant at starting, and resistance to thinning out as temperatures increase during operation.



Reliable hydraulic system operation because Stanoil contains an anti-foaming additive which prevents erratic operation caused by air entrained in the oil.

You get all these advantages in one oil . . . STANOIL

For further advantages of Stanoil in many applications in your plant see a Standard Oil Lubrication Engineer.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA)

STANDARD SERVICE

CLEARING SD-660 PRESS



Choosing the Press to Fit the Job

Where the stamping job to be done places only ordinary demands on the press equipment, a Clearing double crank press of the type illustrated here makes an excellent investment. Clearing developed this new family of presses in addition to its well known eccentric gear type machines because they are naturally less costly to build and will perform certain classes of work equally well.

The Clearing SD-660 press is being used, for example, by leading refrigerator and electrical appliance companies in the production of parts having medium depth of draw.

Extraordinary accuracy for presses of this type is assured by Clearing construction. The one-piece welded frame provides perfect distribution of stresses so as to maintain relationships between slide, dies and bed with minimum variation under severe loads. The two cranks distribute the load over a relatively large bed area without any tendency for the slide to "rock." The long, adjustable gibs provide assurance that slide and bed will be constantly parallel under all conditions.

Clearing engineers can quickly tell you whether the demands of your work can best be filled by a crankshaft type press. Since Clearing builds both crankshaft and eccentric drive presses as well as hydraulics, we are in a position to advise you impartially as to the press equipment best suited to your needs. Ask us to help you.

SPECIFICATIONS

Bed Area — 40" front to back by 60" right to left
Stroke — 10"
Slide Adjustment — 10" by motor
Shut Height — 28"
Speed — 23 strokes per minute
Diameter of Crankshaft at Main Bearings — 6"

CLEARING

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS

*First Series
of Operations*

FIRST REAR SPINDLE

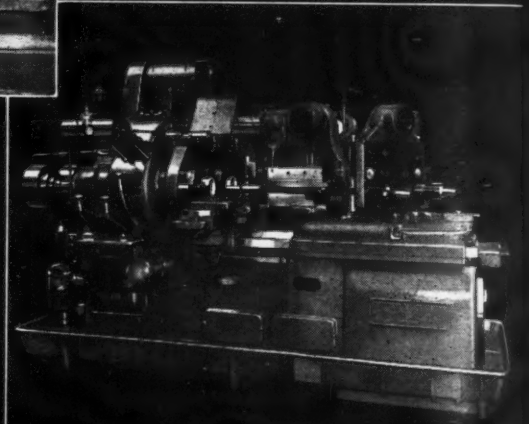
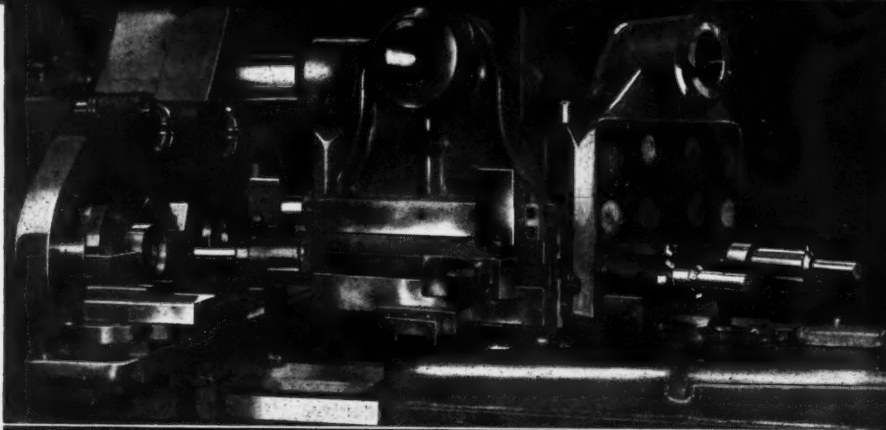
1st TURRET FACE — Drill hole through, approximately 2-1/2" dia. Rough turn O. D.

2nd TURRET FACE — Rough machine counterbore. Face end. Rough bore hole. Chamfer. Form portion of O. D.

3rd TURRET FACE — Finish face counterbore. Face rim (slide tool).

4th TURRET FACE — Finish bore counterbore.

*Two
running*



*Second Series
of Operations*

SECOND FRONT SPINDLE

1st TURRET FACE — Rough bore 3.007" dia. Rough turn portion of O. D.

2nd TURRET FACE — Rough form 30° angle. Form face web. Face end.

3rd TURRET FACE — Finish face web (slide tool). Form portion of O. D.

4th TURRET FACE — Reduce gripping pressure. Finish bore hole. Form rad. at rim of 30-30° angles.

5th TURRET FACE — Generate 30-30° angles.

POTTER

series of operations simultaneously **ON THE P&J Number 5D2-12" TWO-SPINDLE AUTOMATIC**

The commutator ring job (illustrated) calls for some twenty operations on 1040 Cut-off Steel, best performed with flexibility and speed on one machine—the P&J 5D2 Automatic. Work of this nature emphasizes the value of the P&J two-spindle design of the 5D2 series Machines, and the two tool stations on each of the five (or six) turret faces. With different operations progressing at both spindles simultaneously, worth-while output is realized a study of the outline of operations (opposite page) indicates the scope of the work performed: at 80% efficiency, the number of finished pieces per hour per machine totals 7.70—a significant figure. Also significant are the savings in floor space . . . the reduction in power consumption . . . the lower first cost of the machine, compared with two single-spindle units . . . the savings in labor when one operator handles a battery of these machines with convenience. P&J 5D2 Automatics are available in three sizes to fulfill a wide range of requirements: the 5D2-9", the 5D2-12" (illustrated), and the 5D2-15".

R & JOHNSTON
MACHINE COMPANY
PAWTUCKET, RHODE ISLAND

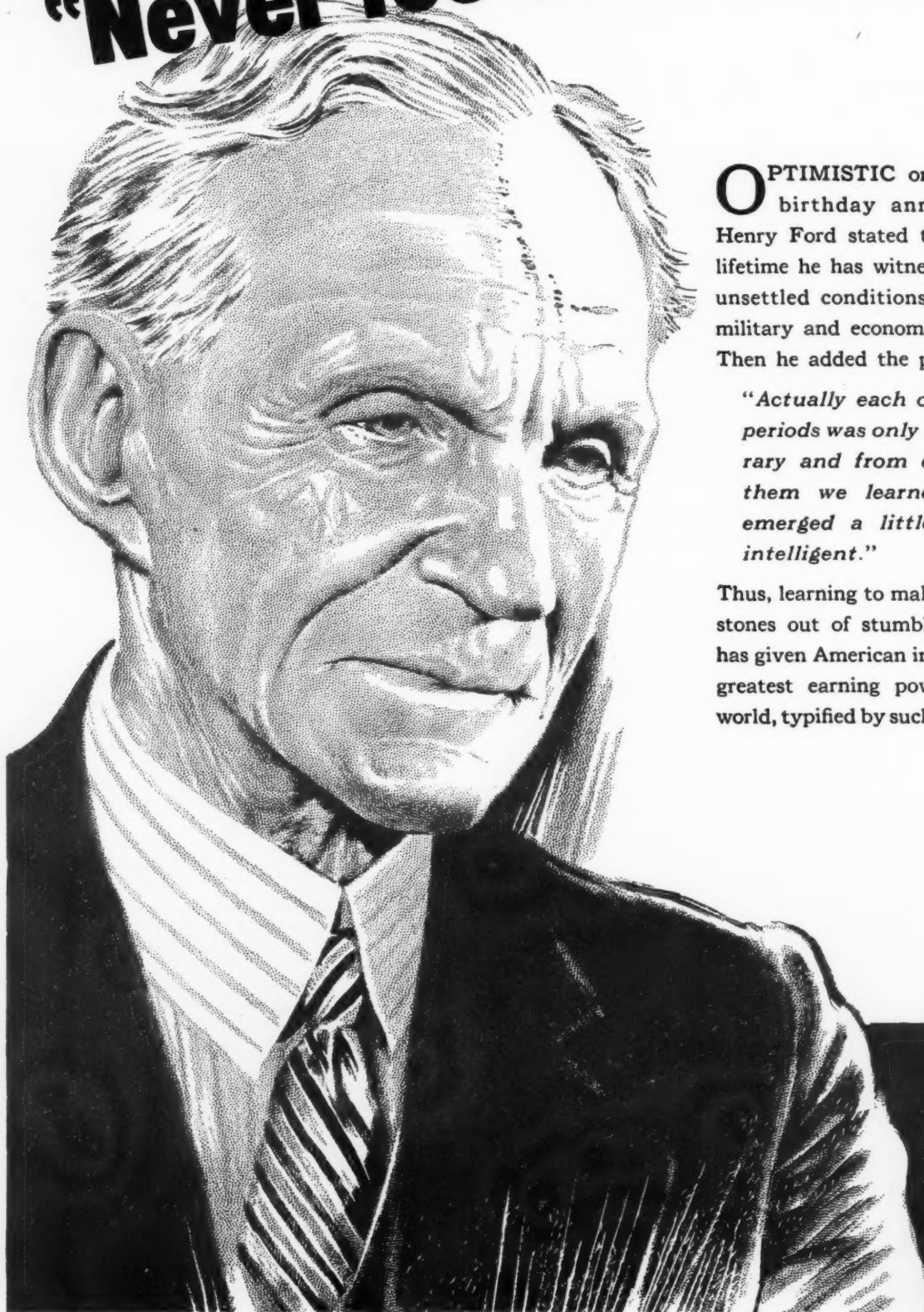


AUTHORIZED AGENTS: U. S. WAR ASSETS CORPORATION

MACHINERY, December, 1946—37

then he said to himself:

"Never too old to earn"



OPTIMISTIC on his 83rd birthday anniversary, Henry Ford stated that in his lifetime he has witnessed many unsettled conditions following military and economic warfare. Then he added the punch line:

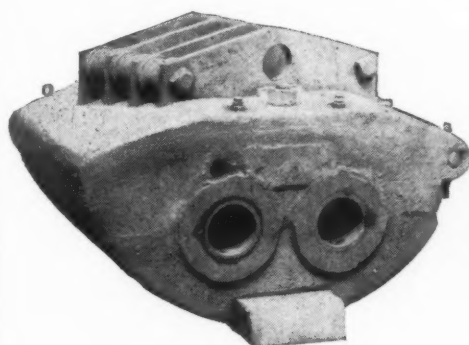
"Actually each of these periods was only temporary and from each of them we learned. We emerged a little more intelligent."

Thus, learning to make stepping stones out of stumbling blocks has given American industry the greatest earning power in the world, typified by such steps as...



Look, Mr. Ford, what one enterprising manufacturer earned and what he learned in the designing of products:

IMPROVE...IMPROVE...IMPROVE with Welded Design



**FORMER DESIGN
COST \$89.05***



**1ST WELDED DESIGN
COST \$91.36****



**2ND WELDED DESIGN
COST \$72.99****

* Includes counterweight. Cost does not include pattern development.

** Cost includes overhead and counterweights (not shown).

Courtesy Wellman Engineering Company, Cleveland, Ohio

A MANUFACTURER of clamshell buckets changed over a counterweight sheave block to welded design. Look what he *earned*. The first welded design cost about the same as the former design but helped absorb shop overhead and made production more flexible. **BUT**, look what he *learned*:

He learned: If the first welded design does not cut costs, it simply means that he does not have the correct answer. By continually thinking in terms of

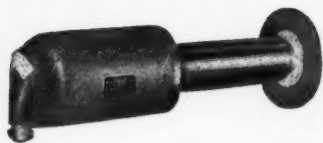
welded design, he can find a *better way at lower cost*. Each improvement becomes a stepping stone to further progress. His second welded sheave block cut the cost 20%.

The Lincoln Engineer nearby will gladly help you explore for similar earnings and learnings in your operations. Machine Design Studies free on request to engineers and designers.

THE LINCOLN ELECTRIC COMPANY • Dept. 305 • Cleveland 1, Ohio

America's greatest natural recourse
ARC WELDING

These **POPE** PRECISION SPINDLES are ready to go to work in your grinders



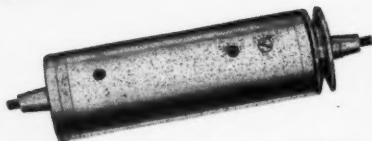
This POPE Sealed Motorized Spindle is recommended for all makes of 6" x 18" surface grinders. It has sealed-in 1 H.P. G-E motor and sealed lubrication, SKF super-precision, double row roller bearings. It assures finer finishes and more production per day and per Spindle.



This POPE Internal Grinding Spindle with sealed lubrication and speeds up to 35,000 RPM is recommended for the production of more accurate hole sizes and better finishes. It comes in a wide range of sizes and speeds.



This POPE Motorized Spindle, with Sealed Lubrication and with 3, 5 or 10 H.P. motor running at 1200, 1800 or 3600 RPM is recommended for a broad range of surface grinder and boring applications. It has the bearing capacity and the rigidity to rough off surplus metal fast and produce a better final finish. It will run in any position.



This POPE Tool and Cutter Grinder Spindle with Sealed Lubrication is operated by single Vee belt drive at speeds up to 6000 RPM. It meets POPE standards of precision, efficiency and lasting performance. Fits standard grinders.



This POPE Double-Ended Tool and Cutter Grinder Spindle with Sealed Lubrication is designed for twin belt pulley center drive at speeds up to 6000 RPM. Fits standard grinders.

These modern "Package Units" have a sealed-in supply of lubricant good for the life of the bearings. Each is a product of extensive research and long experience in

the design and manufacture of Precision Spindles. For prompt action get in touch with Spindle headquarters ...

No. 38

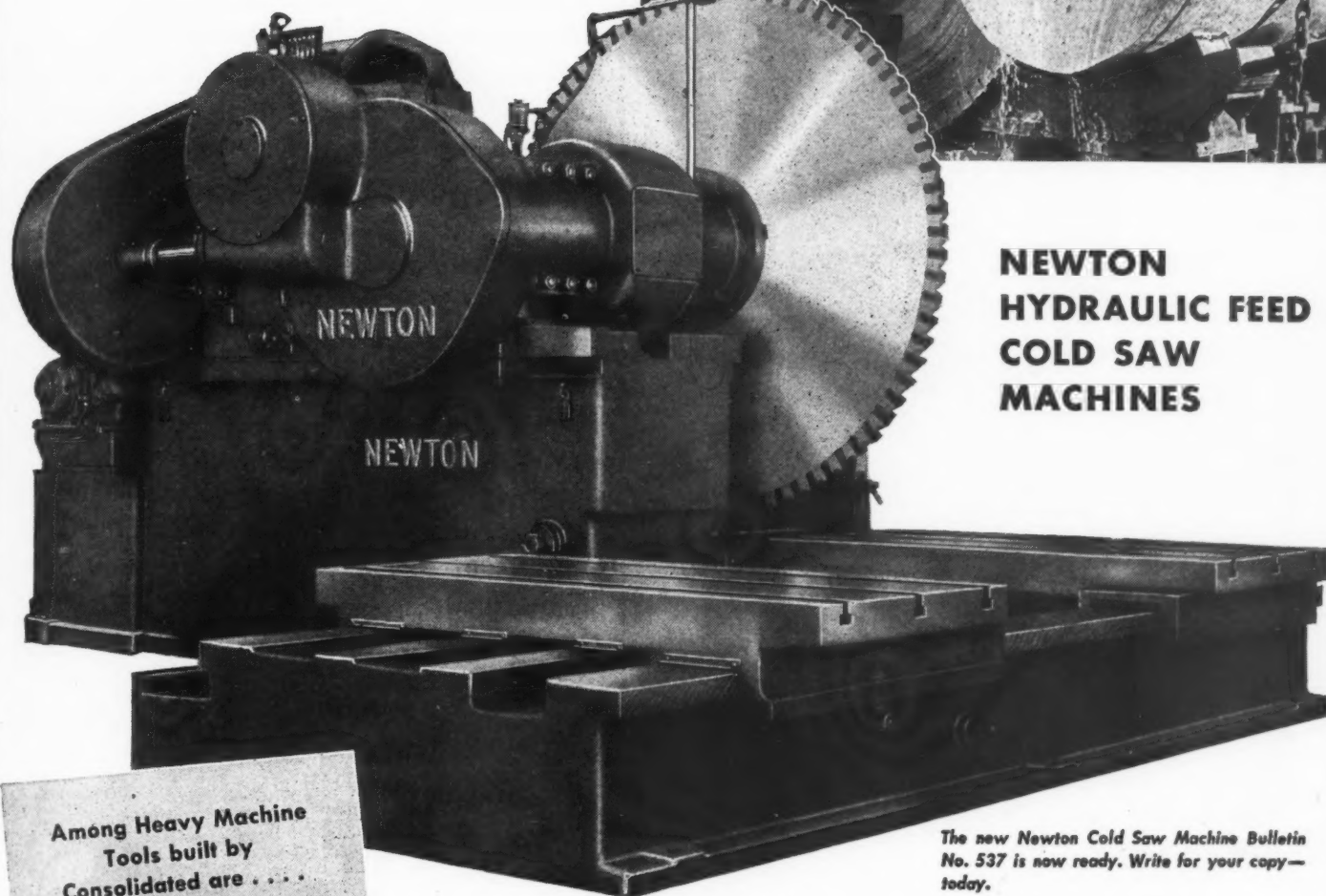
POPE

POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS
BUILDERS OF PRECISION SPINDLES

re
**Their savings
mean lower
operating costs**



**NEWTON
HYDRAULIC FEED
COLD SAW
MACHINES**

Among Heavy Machine
Tools built by
Consolidated are . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL TOOLS

*The new Newton Cold Saw Machine Bulletin
No. 537 is now ready. Write for your copy—
today.*

**NEWTON Hydraulic Cold Saw Machines are built in a
range of designs of proved adaptability to handling all
types of work in either ferrous or non-ferrous metals.
Built in sizes to accommodate blades from 32" to 120"
diameter.**

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1861

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN



**CONSOLIDATED
MACHINE TOOL CORPORATION**

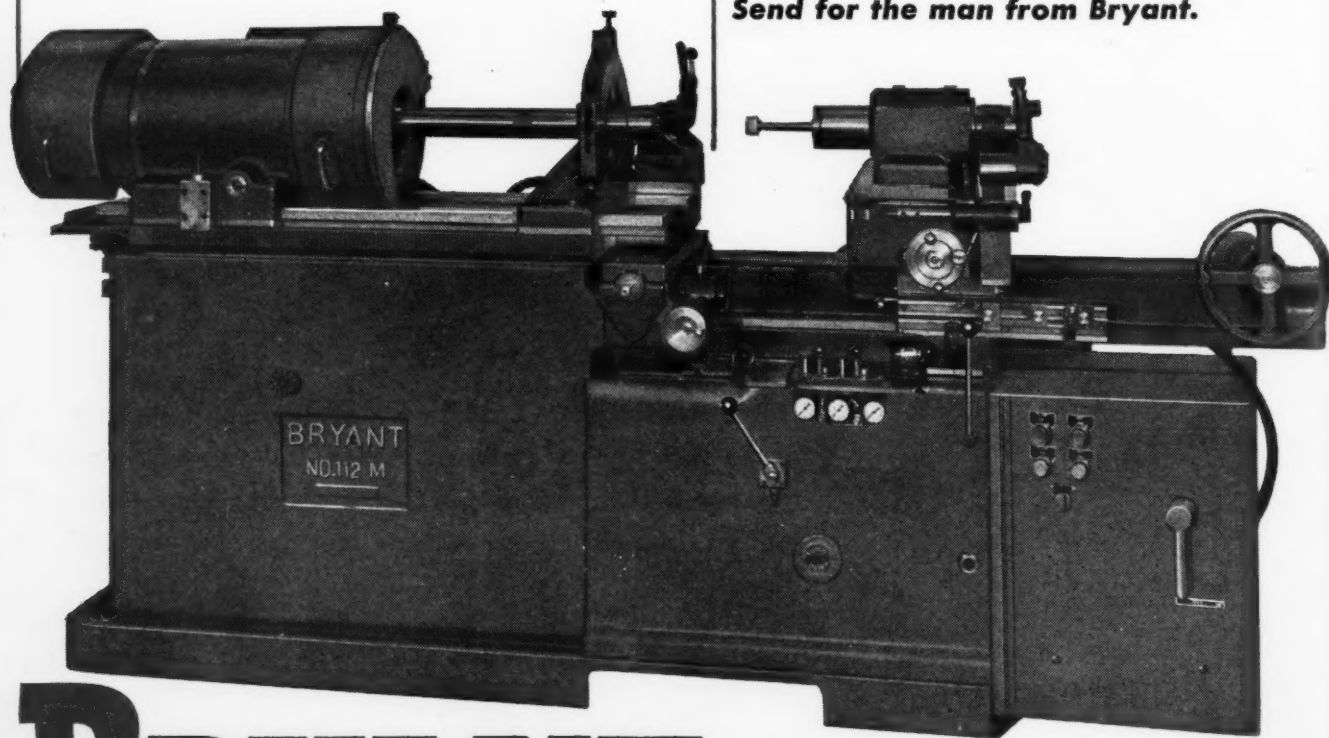
ROCHESTER 10, NEW YORK

ANNOUNCING THE NEW
No. 112-M
HYDRAULIC INTERNAL GRINDER

**FOR
LONG
WORK**

The new No. 112-M Bryant Internal Grinder is designed to precision grind bores up to 9 inches in depth in extra-long, hard-to-chuck parts. Work, such as a machine tool spindle, a long arbor, or a shaft, is supported rigidly, either in a hollow work spindle and steady rest, or by a special fixture that allows the work to run in its own bearings. And, the 112-M offers flexibility that is particularly valuable where production schedules require frequent set-up changes. Adequate longitudinal and swiveling adjustments are provided for grinding tapers up to 30 degrees and reverse tapers up to 10 degrees. A hydraulic retracting mechanism for the wheel slide facilitates loading and gaging long parts, while conveniently located controls simplify operation and set-up. Complete details, capacities and dimensions are contained in the new catalog sheet and will be sent on request — or better still, if you have any work or problems that involve internal grinding —

Send for the man from Bryant.



BRYANT



BRYANT CHUCKING GRINDER CO.

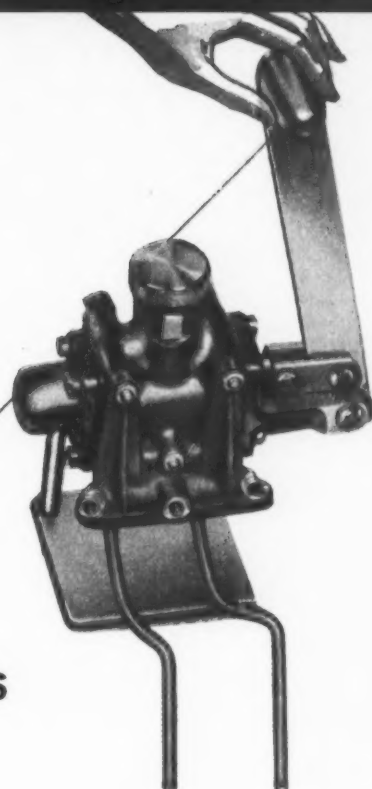
SPRINGFIELD, VERMONT, U. S. A.

DESIGNED FOR MARINE USE, THIS

Hydraulic Remote Control

is built with

Rustless Anaconda Metals



The principle of hydraulic remote control is not new. Its efficiency and simplicity have been amply demonstrated in large military aircraft.

Applying this principle to marine applications, the Marine Equipment Division of Ellinwood Industries in Los Angeles has developed a compact, automatically compensated, positive remote control unit that will transmit 500 inch-pounds of torque through an angular displacement of 60 degrees, with the "master" control and operating "slave" as much as 150 feet apart—both coordinated to a thousandth of an inch! Thus, a simple solution is offered for the problem of remote regulation of throttles, clutches, governors, valves and similar primary controls.

Now, take a look at the components of the dual master control unit illustrated on the following page. Each part is made of a strong, tough, durable copper alloy and, with the exception of the red brass castings, all are Anaconda Metals. Copper, yellow brass, free-cutting brass, phosphor bronze and Tobin Bronze*. Each contributes its special physical properties to a specific purpose . . . all are rustless, corrosion-resistant, sea-going metals, products of The American Brass Company—for years, Industry's principal supplier of copper and copper base alloys.

*Reg. U. S. Pat. Off.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

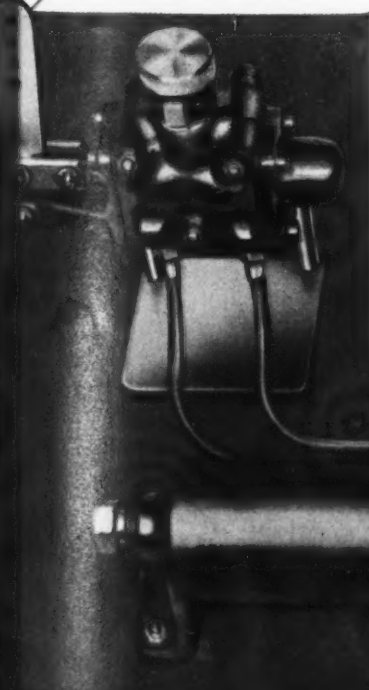
Subsidiary of Anaconda Copper Mining Company

In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

46157



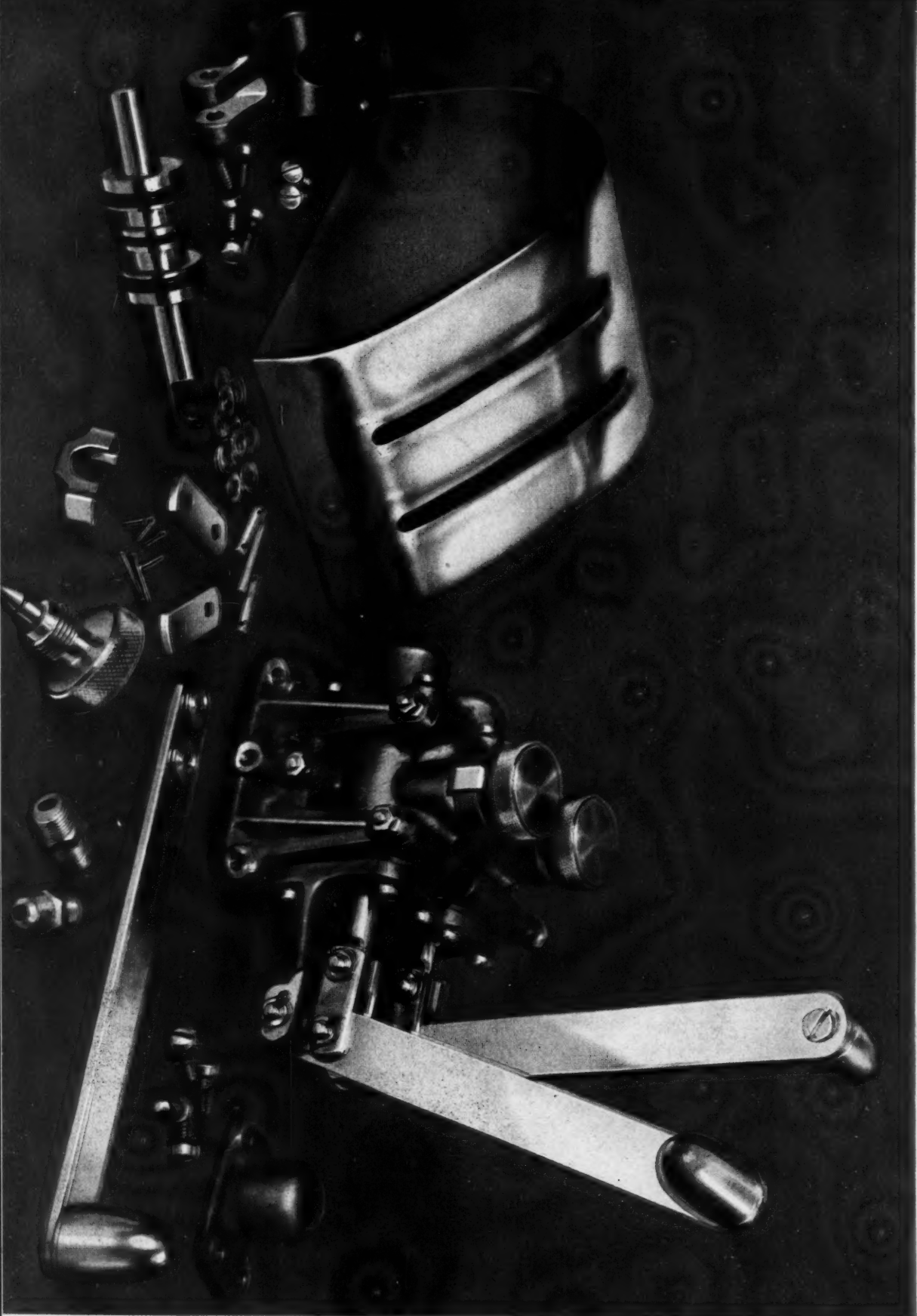
Anaconda Copper & Copper Alloys



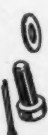


ANACONDA COPPER ALLOYS

extensively used in constructing the *Elimwood* Marine Control



Sheet Brass Housing,
chromium plated



Brass Screws, Washers
and Cotter Pins



Tobin Bronze* Shaft and
Piston, chromium plated



Phosphor Bronze
Tension Spring



Free Cutting Brass
Screw Machine Parts



Tobin Bronze Lever and Turned
Brass Handle, chromium plated



Tobin Bronze Needle Valve

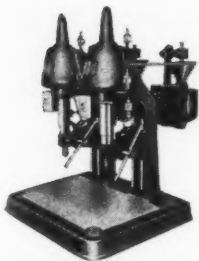


Tobin Bronze Pins and
Links, chromium plated

*Reg. U. S. Pat. Off.

**THE AMERICAN BRASS
COMPANY**

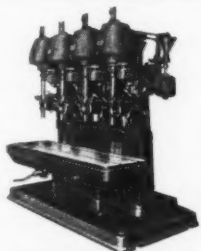
General Offices:
Waterbury 88, Connecticut



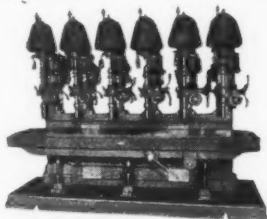
2-SPINDLE 16" NO. 5-10,000
B. V. BENCH DRILL



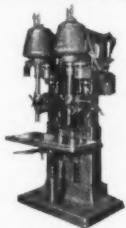
14" NO. 3000 F. V. SENSITIVE
FLOOR DRILL



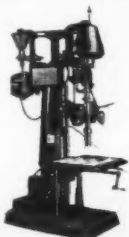
4-SPINDLE 21" BOX COLUMN
SLIDING HEAD FLOOR DRILL



6-SPINDLE 21" BOX COLUMN
SLIDING HEAD FLOOR DRILL



2-SPINDLE 21" BOX COLUMN
SLIDING HEAD FLOOR DRILL



21" BOX COLUMN SLIDING
HEAD FLOOR DRILL



*Around
the World*

THE FINEST DRILL PRESSES MADE BEAR THE CANEDY-OTTO NAME

CANEDY-OTTO provides the world's most complete drill press line for you to choose from — each unit a product of 54 years experience manufacturing drill presses. You can buy all your standard drill presses from this one source, benefitting throughout your plant from the finer precision performance built into every CANEDY-OTTO Drill Press. Do not fill any drill press needs before reviewing the fully illustrated, detailed, CANEDY-OTTO catalog. Get your copy now.

Canedy-Otto Mfg. Company
Chicago Heights, Illinois
Please send illustrated catalog (Insert No. 90):

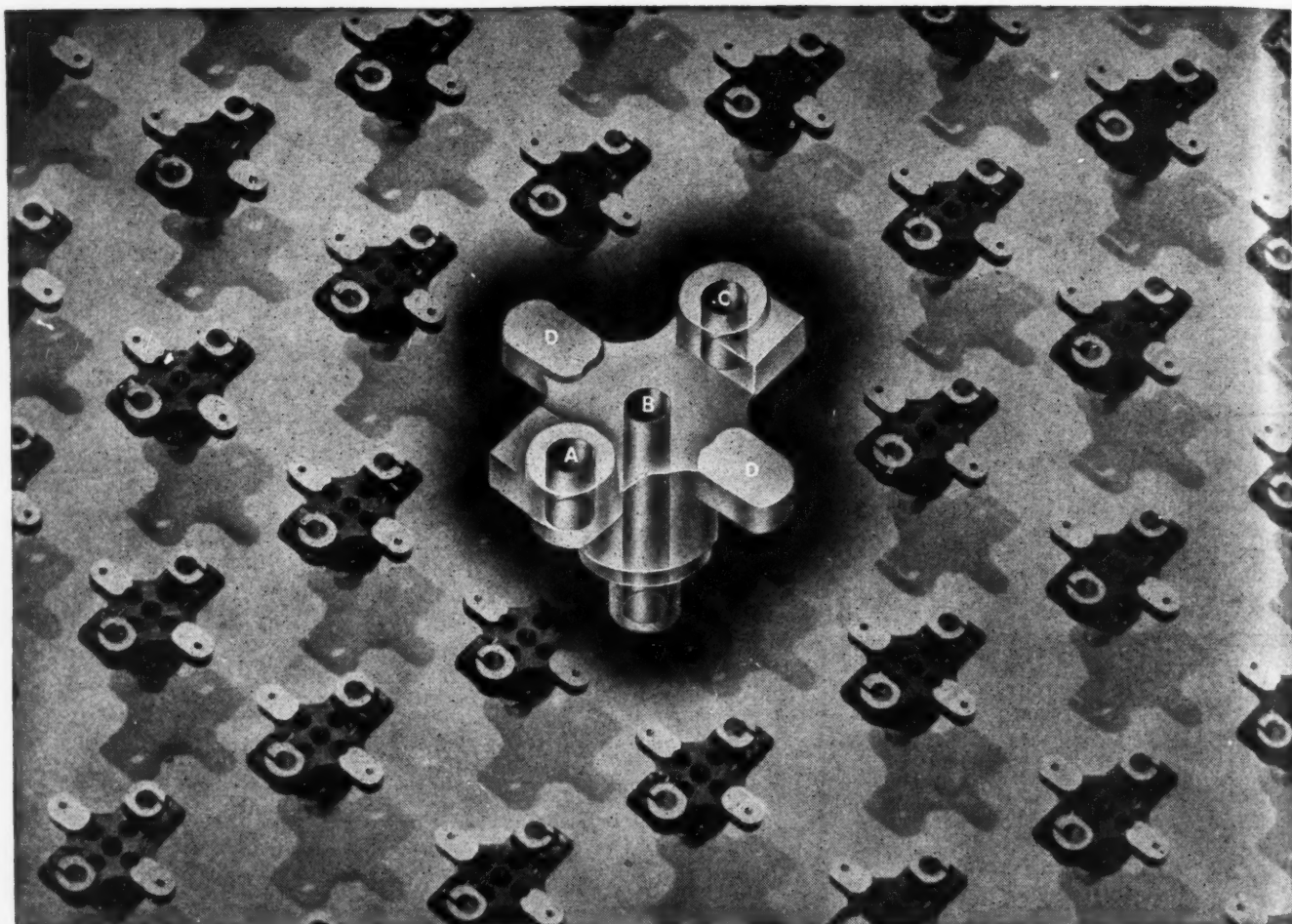
Name

Address

*Mail This
Coupon*

Have The Canedy-
Otto Catalog On
File For Ready
Reference

CANEDY-OTTO MFG. COMPANY, Chicago Heights, Ill.



How to use the *Moore Jig Borer* as a Production Machine

Three holes located and sized, two pads milled—in a single set-up; 5,000 aluminum parts—6 minutes each.

Are you limiting the capacity of your jig borer by using it only on toolroom work? You needn't...if it's a Moore Jig Borer.

For this versatile machine not only adds toolroom accuracy to your production jobs but often outperforms special-purpose machines. Here's proof on a run of 5,000 aluminum parts:

Holes A, B and C were located to a tolerance of .0005", sized to +.0005", —.0000"...had to be parallel to .001" checked on plugs 1" long...two pads D milled to $\pm .001$ ".

In order to hold these pads in close relation to the holes, the job was done in a single set-up.

A drill jig couldn't handle such close tolerances; reamers and bushings would wear. Since aluminum

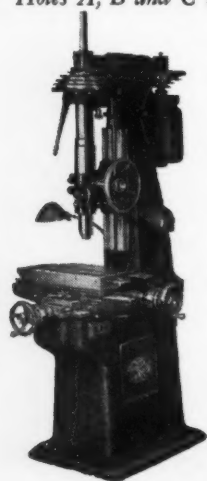
is not free-machining, a good finish would be difficult to obtain with reamers.

The only answer was single-point boring. After the holes were roughed out with a jig costing \$75, the Moore Jig Borer machined them to exact location and size. The entire operation, including the machining of the two pads, required only six minutes each and reduced appreciably all previous costs.

Such speed and accuracy are the result of the Moore Jig Borer's sensitive spindle which provides speeds to 2,600 RPM, and quick-setting lead screws. The latter, ground to an accuracy of .0002" in 16", enables you to spot, drill, bore and ream holes in one set up, with minimum tool changes.

Remember this versatility when you specify your next jig borer. Meanwhile, write for illustrated literature.

MOORE SPECIAL TOOL CO., INC.
734 UNION AVENUE, BRIDGEPORT 7, CONN.



MOORE JIG BORER



SPOTS, DRILLS, BORES, REAMS...WITH MINIMUM TOOL CHANGES

You Can COUNT ON VEEDER-ROOT

to Build **"COUNTROL"**

into Your Product or Process



... with either Standard or Special Veeder-Root Counting Devices

Take a rolling mill, a machine tool, jet plane, juke box — or what have you? Odds are long that there's a place ready and waiting, *though perhaps as yet undiscovered*, for Veeder-Root *Countrol* in your product-design and sales-promotion plans.

And now's the time to find out. Ask a "Counting House" engineer to count up the ways in which you can profit by building into your product or process the right Veeder-Root Device (standard or special) ... like, for one instance, the standard Medium Size Rotary Ratchet Counter shown above.

Remember, too, that *Countrol* can profit your customers as well as yourself ... can help to keep you on friendly terms by proving your

product's guarantee. Find out just how much you *can* count on. Write today to Veeder-Root Inc., Hartford 2, Conn. *In Canada:* Veeder-Root of Canada, Ltd., 955 St. James St., Montreal 3. *In England:* Veeder-Root Ltd., Dickinson Works, 20 Purley Way, Croydon, Surrey.

Give your product this extra Merchandising

Feature



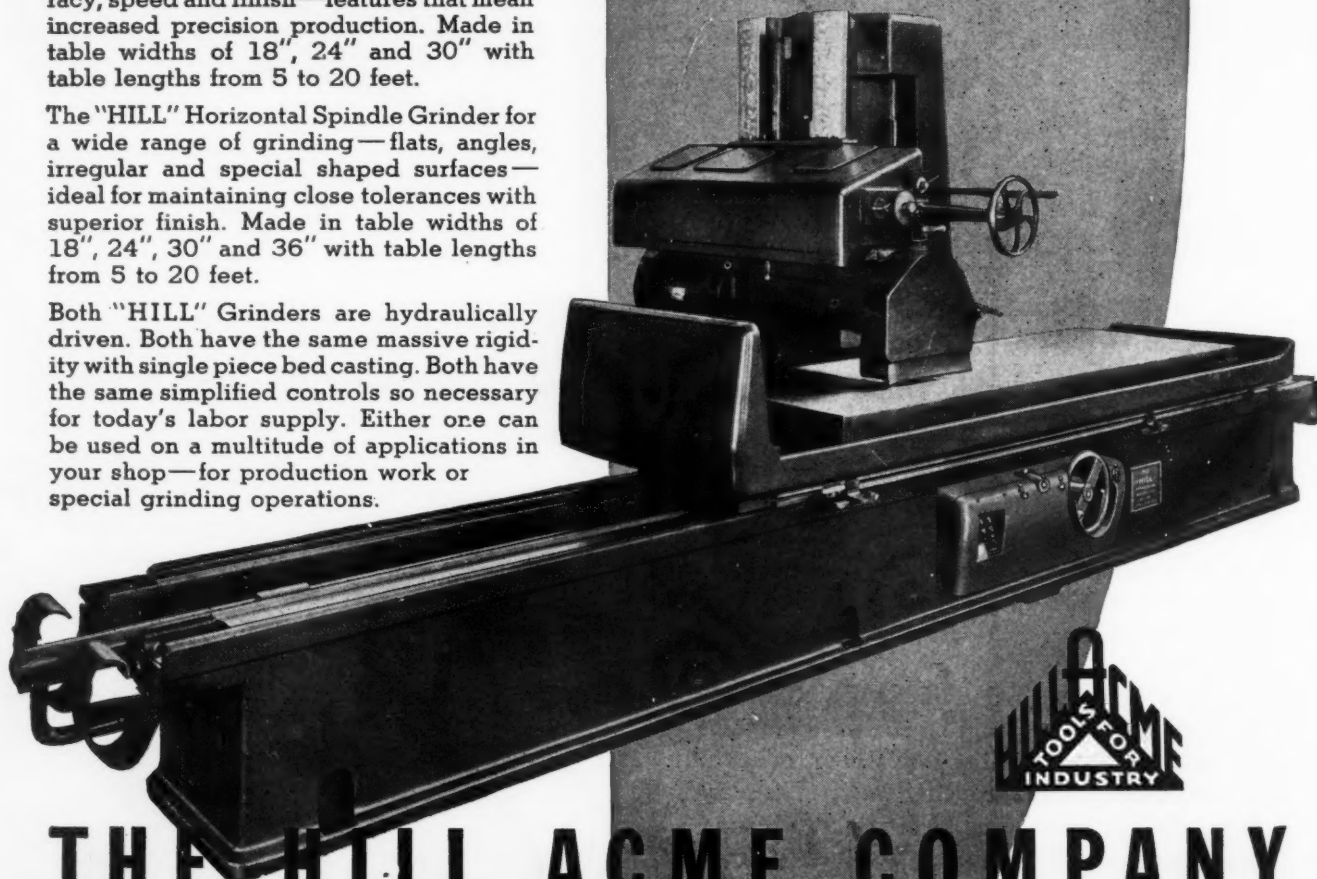


The
HILL "TWINS"
ONE OR THE OTHER WILL SOLVE EVERY
HEAVY DUTY SURFACE GRINDING PROBLEM

The "HILL" Vertical Spindle Grinder for rapid stock removal and accurate grinding of flat surfaces—recommended for accuracy, speed and finish—features that mean increased precision production. Made in table widths of 18", 24" and 30" with table lengths from 5 to 20 feet.

The "HILL" Horizontal Spindle Grinder for a wide range of grinding—flats, angles, irregular and special shaped surfaces—ideal for maintaining close tolerances with superior finish. Made in table widths of 18", 24", 30" and 36" with table lengths from 5 to 20 feet.

Both "HILL" Grinders are hydraulically driven. Both have the same massive rigidity with single piece bed casting. Both have the same simplified controls so necessary for today's labor supply. Either one can be used on a multitude of applications in your shop—for production work or special grinding operations.



THE HILL ACME COMPANY

6400 BREAKWATER AVENUE • CLEVELAND 2, OHIO

"HILL" HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING • THREADING • TAPPING MACHINES
 "CANTON" ALLIGATOR SHEARS AND PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES AND SHEAR BLADES

For efficient lubrication the year-round,
lower operating costs,

take these two easy steps



Call in a Gulf Lubrication Engineer

Adopt Gulf Periodic Consultation Service

HERE'S a practical plan for modernizing your lubrication practice—to help your machines and equipment meet today's increasing production requirements.

Through Gulf Periodic Consultation Service you get effective and continuous assistance on your lubrication problems from an experienced Gulf

Lubrication Engineer. This trained specialist will consult regularly with your operating and maintenance men—give you the benefit of latest developments in petroleum science.

Call in a Gulf Lubrication Engineer today and ask him for additional information on this advanced plan. Write or phone your nearest Gulf office.

Gulf Oil Corporation • Gulf Refining Company, Gulf Building, Pittsburgh, Pa.
DIVISION SALES OFFICES: Boston • New York • Philadelphia • Pittsburgh • Atlanta • New Orleans • Houston • Louisville • Toledo



Helps make machines
produce more at lower cost

The CONE AUTOMATIC MACHINE COMPANY



sees many

GOOD THINGS AHEAD

It is reported that

A. O. Smith's new plant at Kan-kakee will have the largest radiant heating plant on record. Water, heated to 140 deg. by 120 separate heaters will circulate through 40 miles of pipe laid in the floor slab.

get ready with CONE for tomorrow

The making of acetylene from natural gas is being studied and reports may be expected from the Department of Commerce.

get ready with CONE for tomorrow

Muncie Gear Works proposes to market a "reverse cycle" heating plant this year.

get ready with CONE for tomorrow

Truck bodies of magnesium are being made by Barry and Bailey Co. of Philadelphia.

get ready with CONE for tomorrow

Blue Mountain Clay Co. of Memphis makes a new oil, grease and water absorbent for oily and wet floors that is said to absorb 120% to 140% of its weight.

get ready with CONE for tomorrow

The Public Health Service announces that satisfactory substitutes for mercury have been found that end the hazard of mercury poisoning (the origin of the term "mad hatter") in the hat making industry.

get ready with CONE for tomorrow

In a new thickness gage, designed by Glenn L. Martin Co., a dial registers the deflection of a sheet of metal when a predetermined vacuum is created on one side of it.

get ready with CONE for tomorrow

The idea of the variable pitch propeller has been applied to industrial fans by Evans Products Co. Operated by a built-in thermostat, it maintains constant engine operating temperature.

get ready with CONE for tomorrow

An electrically conductive, non-sparking linoleum has been introduced by Congoleum-Nairn.

General Electric has patented a new type of household refrigerator which maintains temperature at two levels simultaneously.

get ready with CONE for tomorrow

The Bureau of Mines has recently released information on its process for the electrolytic method of producing manganese.

get ready with CONE for tomorrow

Pullman-Standard has increased its output of car wheels ten times by using a machine which revolves the tool instead of the wheel.

get ready with CONE for tomorrow

National Tube Co. claims that its new plant at Lorain, Ohio, is the world's first straight-line seamless pipe mill. It produces 2,000 feet of seamless steel pipe per minute.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

The Office of Technical Services of the U. S. Dept. of Commerce reports on a silver-magnesium solder that can withstand the heat of gas turbines.

get ready with CONE for tomorrow

"Multi-tule", a profile blade type form tool holder, is to be made available to users of a well-known make of multi-spindle automatic lathes. The holder is particularly adaptable to short runs and cuts down time in tooling change-overs. It reduces the number of holders ordinarily required for a number of jobs.

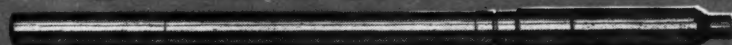
get ready with CONE for tomorrow

Dr. Baetjer, of Johns Hopkins University, prophesies that by 1950 one in every three women over fourteen will be employed in industry.

get ready with CONE for tomorrow

The *USS Salem* and *USS Newport News*, now being built, will be the first ships in what is promised to be a completely air-conditioned Navy.

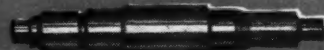
Emphatically Conomatic!



25 $\frac{5}{8}$ " long, 16 operations in 63 seconds from 1 $\frac{3}{8}$ " dia. hot rolled.

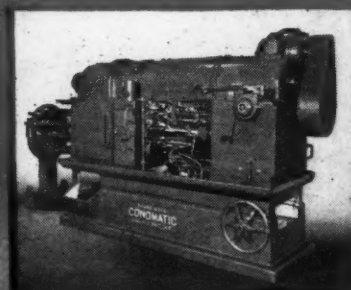


10 $\frac{7}{8}$ " long, 16 operations in 65 seconds from 1 $\frac{1}{4}$ " dia. SAE 4620.



10 $\frac{5}{8}$ " long, 12 operations in 54 seconds from 1 $\frac{5}{8}$ " dia. SAE 3115.

Any good multiple spindle automatic should handle the ordinary run of shaft work. But Conomatics are also adaptable to the unusually tough jobs. The illustrations show this plainly.



Ask your CONE representative to show you our new color motion picture

CONE

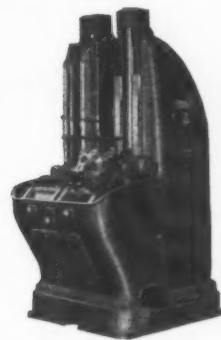
AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.



Surface Broaching IN THE AUTOMOTIVE INDUSTRY

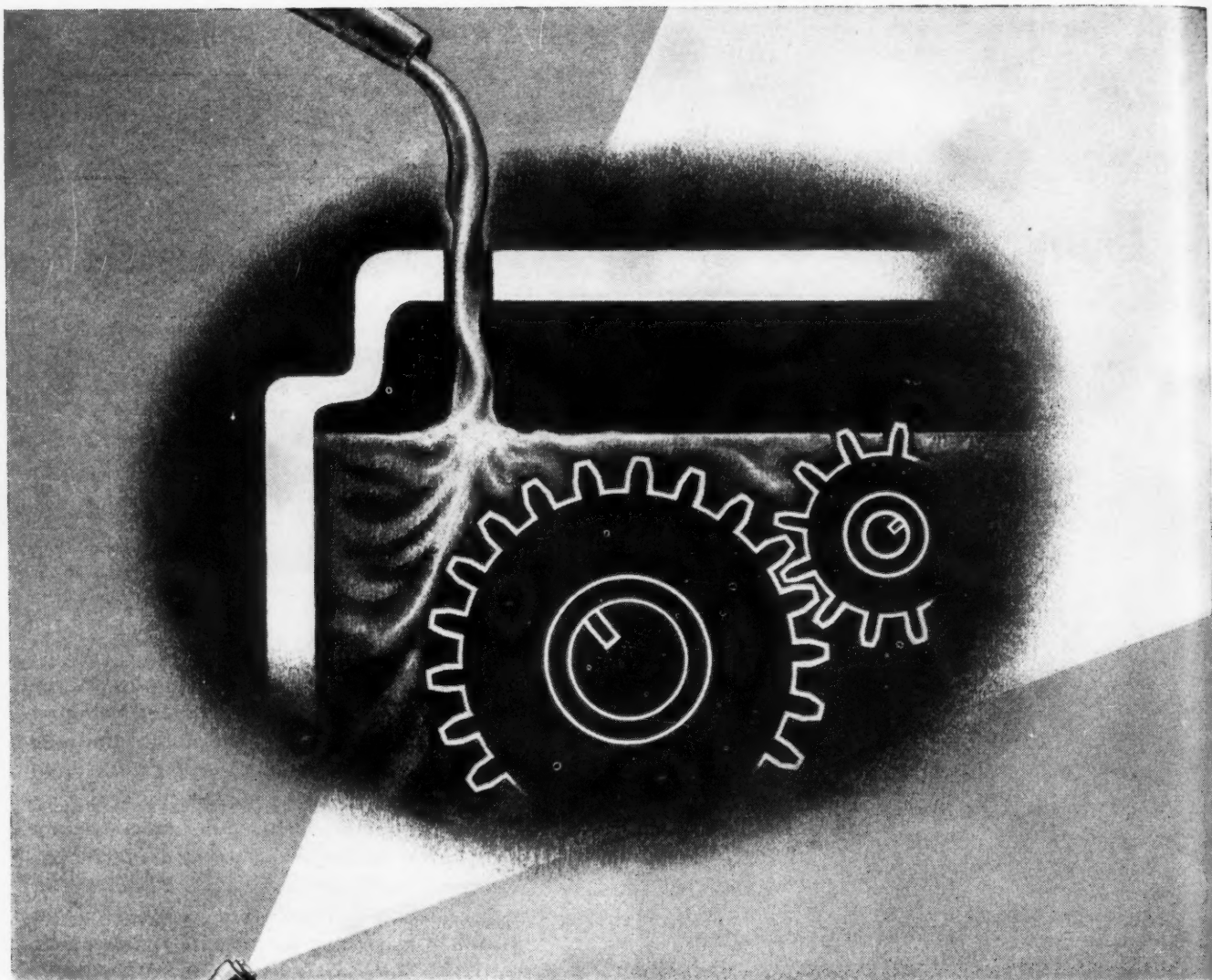
We suggest that you investigate now the advantages of surface broaching for the machining of parts like these in the illustrations. Hundreds of similar parts in plants thruout the automotive industry are now being surface broached on Footburt machines; faster, more economically and to closer limits than by previous machining methods. Send your blueprints and information on production requirements to the pioneers in surface broaching for recommendations on the proper Footburt machines to do the work.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: General Motors Building



Footburt Patented Tooth Form

FOOTBURT *Surface Broaching*



Special Lowe Brothers Sealer Protects Power Unit Mechanisms

Corrosion, core sand and foreign elements are enemies of hydraulic units, transmissions and gear housings, which run in oil or use oil to transmit power in many types of precision mechanisms. Ingenious design and accurate workmanship are virtually useless unless the interior of cast housings is adequately finished to eliminate these problems.

A special paint coating, developed several years ago by Lowe Brothers, has proved the answer to these problems. It is a sealer which may be either

brushed or sprayed with consistently satisfactory results.

The application of this sealer to the interior of cast housings seals in any core sand and foreign elements not removed in casting preparation.

It will not chip off nor permit corrosion to gum the oil.

It stands up perfectly under constantly circulating hot oil.

The sealing and protecting qualities of this Lowe Brothers finish thus safeguards the entire

unit against disastrous effect of foreign matter detrimental to working parts.

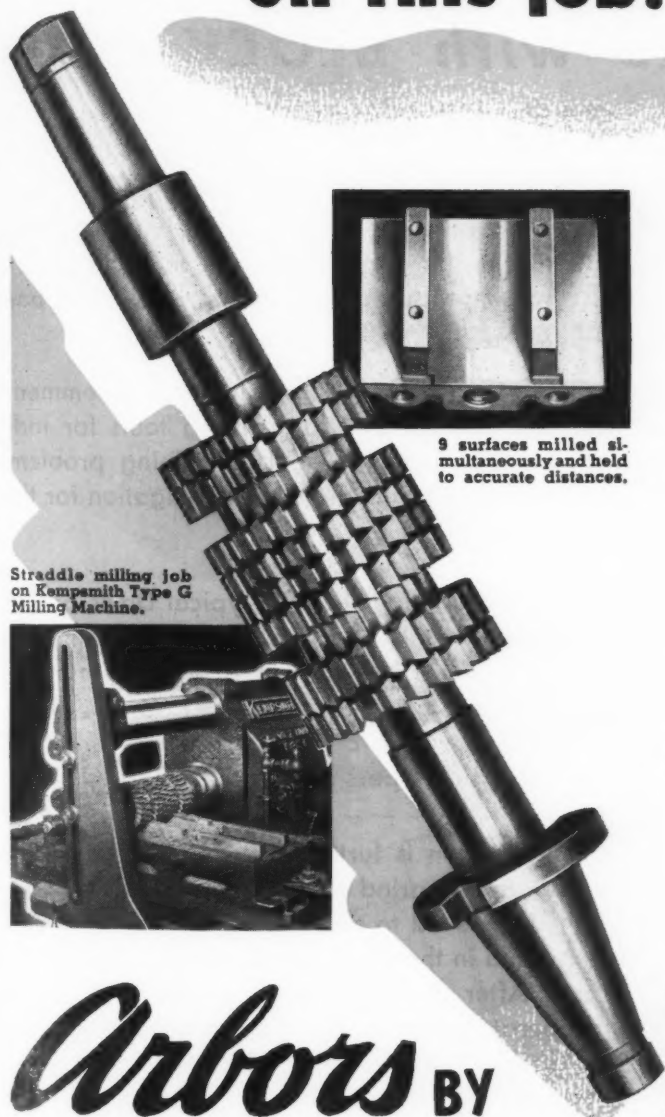
Whatever your finish problem, Lowe Brothers experience in serving designers and makers of machines and precision equipment, is at your disposal. Your request for advice involves no obligation.

INDUSTRIAL SALES
THE LOWE BROTHERS CO.
DAYTON, OHIO

Lowe Brothers **FINISHES for Industry**

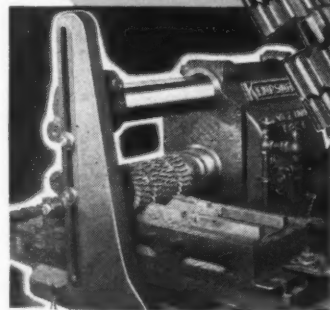


**Yes Sir - we
SAVED 10 HOURS
on this job!**



9 surfaces milled simultaneously and held to accurate distances.

Straddle milling job on Kemp Smith Type G Milling Machine.



"Instead of knocking down the cutter and arbor set-up for this straddle-milling job, we did the sensible thing—we kept the complete set-up intact, ready for the next production run. The initial set-up required 10 hours . . . so we'll again be saving that much time on the next lot."

Today, especially, it's vitally important to conserve production time. It takes many hours to reconstruct multiple cutter assemblies. Save this valuable time by laying aside the complete set-up for the next run. Have an extra supply of arbors on hand for this purpose. Remember, arbors are "perishable" tools and their cost today is relatively small. That's why —

It always pays to
SAVE THE SET-UP!

Kemp Smith Arbors are available in all popular sizes and types, adaptable to any make of milling machine with standardized spindle. Mail coupon for literature.

THE KEMPSMITH MACHINE CO.

1821 S. 71st STREET

MILWAUKEE 14, WIS., U. S. A.

Arbors BY KEMPSMITH

Precision Built Milling Machines Since 1888

**Write
Today!**

KEMPSMITH — Yes, I would like to receive a copy of your new Arbor Bulletin:

NAME _____ TITLE _____

FIRM _____ ADDRESS _____

A 4653-1P-C

52 Precision Cuts

IN ONE WORK SETTING

MADE POSSIBLE BY DAVIS BORING BARS with BLOCK TYPE MULTIPLE CUTTERS

ROUGH, SEMI-FINISH AND FINISH BORING, COUNTERBORING, CHAMFERING AND FACING PERFORMED ON TRACTOR TRANSMISSION

Why make only one boring cut at a time when it is common sense machining practice to use Davis Block Type Boring Bars for multiple cutting operations? In the cycle of this 3-way boring machine, 9 Davis Bars produce 52 different precision cuts to complete a tractor transmission in 6 minutes. Here boring bars with block type multiple cutters, rough, semi-finish and finish bore as well as counterbore, chamfer and face. The bars in each head unit operate simultaneously.

SIMILAR DAVIS TOOLING MAY EASILY CUT YOUR PRODUCTION TIME AND COST

Even now you may be able to efficiently make multiple boring, reaming, facing, counterboring, chamfering, recessing and similar operations with one Davis Boring Bar. A comparison of your present conventional single point cutters may indicate

simpler ways of combining operations by using Davis Boring Bars with Block type multiple cutters. As a result production will be increased and part cost reduced.

Capable Davis engineers are ready to recommend both standard and special boring tools for individual needs. Outline your machining problems or send a part print. There is no obligation for this tooling help.

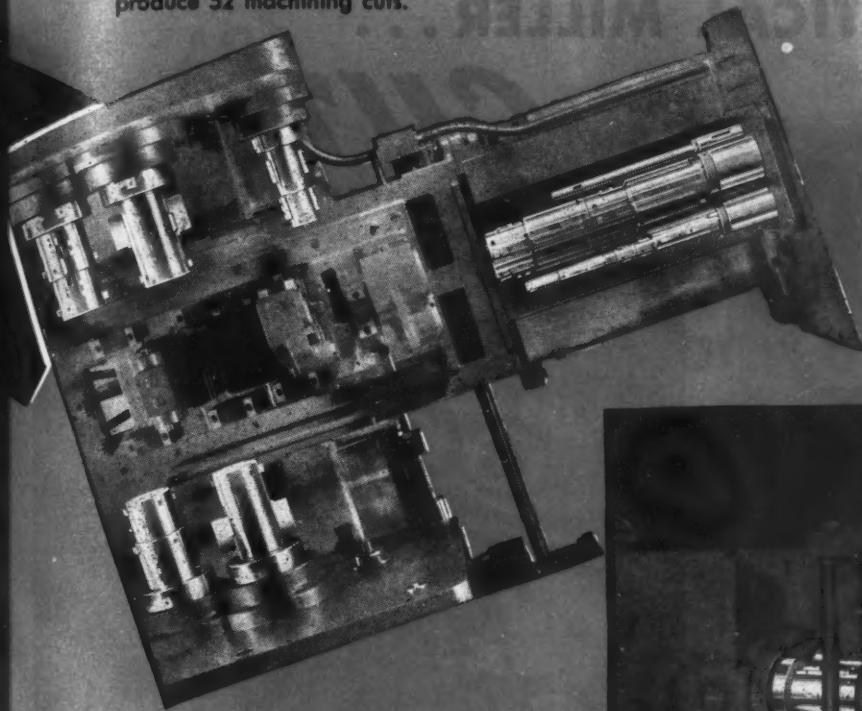
— This drawing shows a typical Davis boring tool that is designed for production runs. By placing a number of cutting tools including a Davis cutter block in the boring bar, a series of operations are completed in a single pass of the tool.

Part production is further speeded by the simple method used to grind cutters. When dull, the cutter block is removed to the tool room and the cutters are ground in the block, the latter forming its own arbor. After simple assembly at the machine by the operator, the bar is again ready for service. This method of handling dull cutters often eliminates all adjustments by the operator, which results in greater quality control and minimum machine down time.

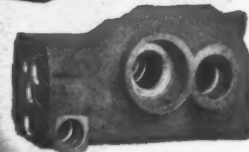


DAVIS BORING TOOL DIVISION OF

(Below) 9 Davis Block Type Boring Bars are used for production boring on this Greenlee Machine to produce 52 machining cuts.



(Right) Davis Boring Bars equipped with block type multiple cutters used on a 3-way boring machine.

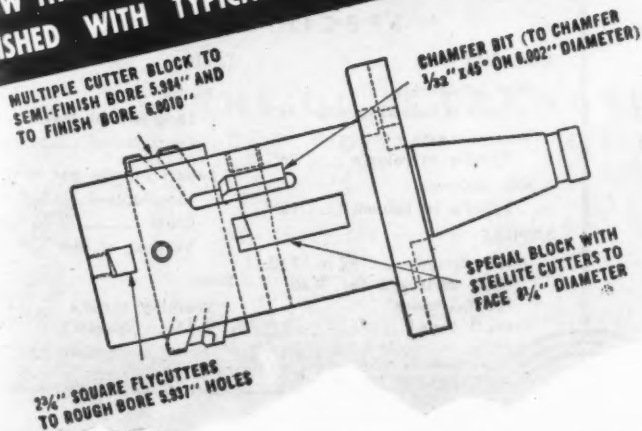


Right and left hand view of tractor transmission showing various bores.



Photographs courtesy Greenlee Bros. & Company, Rockford, Illinois.

HOW THIS HIGH PRODUCTION BORING IS ACCOMPLISHED WITH TYPICAL DAVIS BORING TOOLS



Plan

To Use This Free Information descriptive of Davis standard and special boring tools that increase production and reduce part costs. Ask for Production Data Folder MA 126.

GIDDINGS & LEWIS MACHINE TOOL CO.
140 DOTY ST. • FOND DU LAC, WIS., U. S. A.

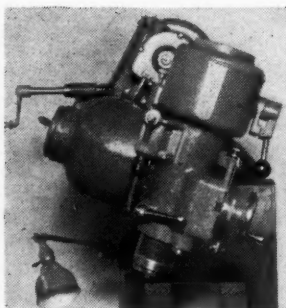


The 12-V UNIVERSAL HEAD VERTICAL MILLER...

CUTS TOOLROOM COSTS!



Universal head swivels 45 degrees front and back of vertical.

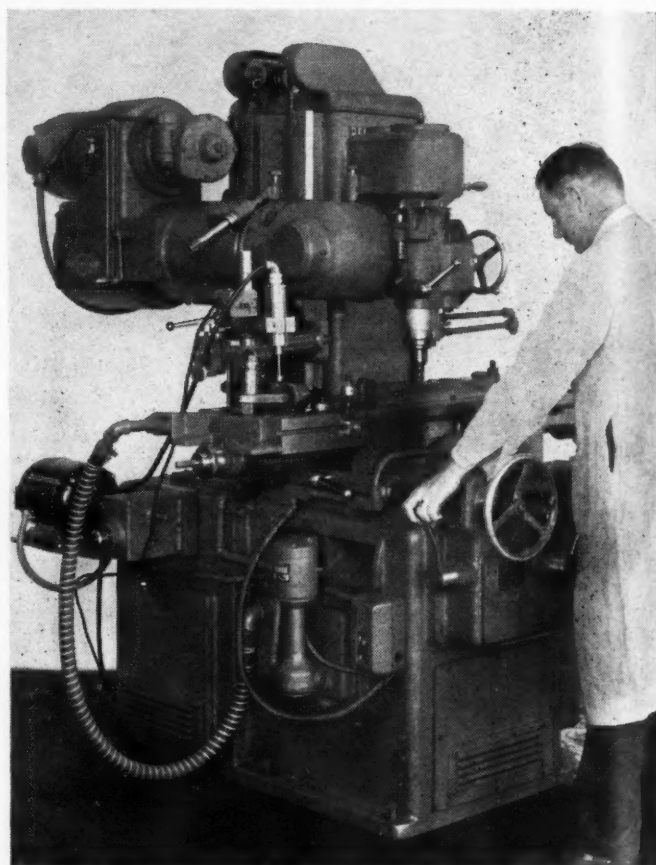


Universal head swivels 30 degrees left and right of vertical.

because...

- 1** The universal head permits wider range of work with minimum set-up time.
- 2** This all-purpose 12-V is a high speed miller, die sinking and boring machine — all in one.
- 3** It's natural versatility is increased by provision for high speed milling and slotting attachments.
- 4** The central electronic panel gives instant control of infinitely variable feeds and speeds — lessens operator fatigue.
- 5** One shot lubrication guards against excessive wear of moving parts — insures long, trouble-free production.
- 6** Gears are easily accessible for periodic inspection.
- 7** Perfect balance of universal head on vertical saddle insures minimum wear and maximum accuracy.
- 8** All motors foot mounted.

WRITE FOR DESCRIPTIVE FOLDER TO DEPT. B.



Reed-Prentice 12-V Miller with Duplicator attachment.

SPECIFICATIONS

CAPACITY

Max. distance	
Table to face of spindle	18"
Max. distance	
Spindle to column	26"
Min. distance	
Spindle to column	12"

SPINDLE

Infinite Speeds	97 to 1730
RPM; arranged for	#40
NMTBA taper.	
Vertical travel	5"

TABLE

Range:	
Longitudinal travel	28"
Cross travel	12"
Feeds: Infinite per Min.	
Longitudinal	1/4" to 24"
Cross	1/4" to 24"
Vertical, of ram	1/8" to 16"

Size:

Working surface	12" x 46"
3 T-Slots (spaced 3")	11/16"



NEW YORK OFFICE: 75 West St., New York 6, N. Y.

CLEVELAND OFFICE: 1213 W. 3rd St., Cleveland 13, Ohio.

Which "Surplus" TOCCO Machine fits *your* induction heating job?

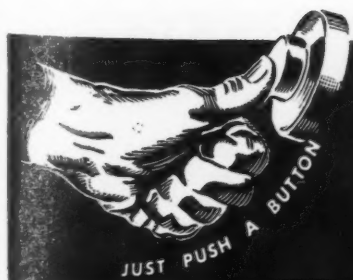
Let us help you decide.

We maintain complete records of every TOCCO machine ever sold. We can tell you the date it was shipped from our factory . . . the job for which it was originally designed . . . and complete specifications of the unit as it was shipped.

If you intend to buy a Government Surplus induction heating unit, be sure to consult us first because, whether you buy a new TOCCO machine from us or a used "Surplus" unit from the War Assets Administration, we want to make sure that it is the right TOCCO unit for your particular requirements.

Contact us so we can tell you how adaptable any "Surplus" machine is to your particular job. We are authorized dealers for Government Surplus TOCCO Equipment and can facilitate your purchase.

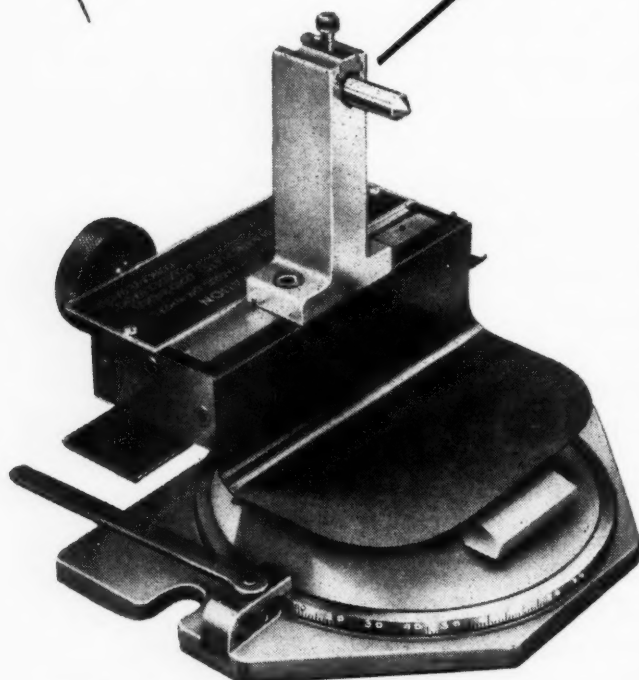
THE OHIO CRANKSHAFT COMPANY
DEPT. M • CLEVELAND 1, OHIO



TOCCO

INDUCTION
HARDENING, BRAZING
ANNEALING, HEATING

How to Dress Radii Angles Tangent to Radii *to .0001" Accuracy*



The VINCO B-1 DRESSER — the most accurate formed wheel dresser available. Investigate this tool at your earliest opportunity.

The VINCO B-1 DRESSER, the most accurate tool of its kind, will dress forms on grinding wheels to an accuracy of .0001", quickly and easily.

We know you don't require such gage tolerances on your grinding wheels every day in the year, but, when you ARE faced with an exacting dressing job you can handle it with confidence if you use a VINCO B-1 DRESSER. And don't think you should use it only on specials. The VINCO B-1 DRESSER is built so sturdily that it can take constant usage for a long, long time and still keep its built-in accuracy.

Equipped with the standard diamond tool, it will dress convex radii up to $2\frac{1}{2}$ " and full 180° concave radii from $2\frac{3}{32}$ " up. The half-circle attachment permits the dressing of full 180° concave radii from $\frac{1}{16}$ " to $2\frac{1}{2}$ ". The dresser rotates on a precision bearing. The index plate is graduated in degrees and may be set to within ten minutes on the vernier. A free-floating clamp rigidly locks the index plate without distortion and without disturbing the radius setting. The dresser can be used on all surface grinders, and sub-bases (at slight additional cost) adapt it for use on most types of grinders.

MILLIONTHS OF AN INCH FOR SALE BY VINCO

REG. U. S. PAT. OFF.

VINCO CORPORATION, 8853 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN; SALES OFFICES, NEW YORK, CHICAGO, CLEVELAND

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Plain Cylindrical Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Shaft and Hub Gages • Built-up and Special Gages • Gear Rolling Inspection Fixtures • Indexing Fixtures • Hydraulic Power Control, Utilization and Distribution Units • Engineering, Design and Development • Precision Production Parts.



20% LOWER COSTS

Jobs like the cleaning of cored holes in blower housings were being done with 6"—6,000 R.P.M. grinders, weighing 11½ lbs., with 2¾" diameter cone wheels in this gray iron foundry. Wheel loss was excessive. The Rotor Application Engineer suggested a Rotor Model D-77—8,500 R.P.M. cone grinder weighing only 9 lbs., and demonstrated this tool on the job. The changeover gave these returns:

20% lower grinding costs because:

Higher surface speed of the cone wheel removed the

metal faster. Lighter weight of tool makes it easier to handle.

Additional savings:

One-third less wheel cost due to higher wheel speed under load.

There is no obligation for a similar study of *your* portable tool operations with the idea of cutting your grinding costs.

Yours for the right tool,

AIR O'TOOL



AIR

THE ROTOR TOOL CO.

CLEVELAND, OHIO

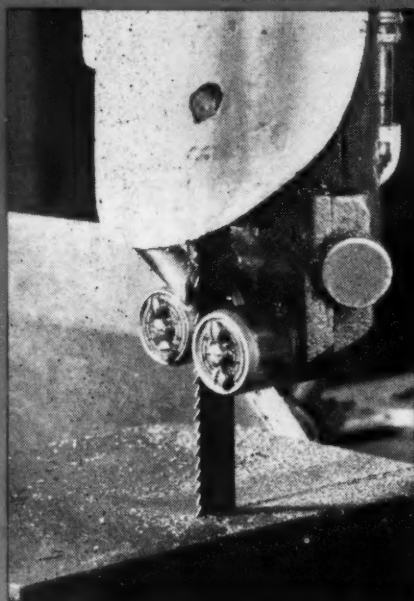
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



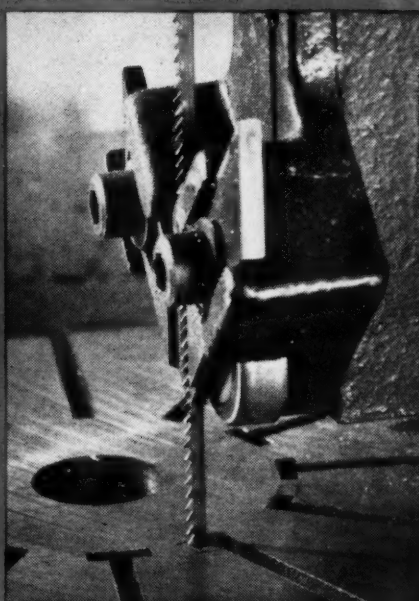
HIGH CYCLE

How Small Shops and Big Plants SAVE MACHINE-HOURS AND SPUR PRODUCTION BY USING **SIMONDS** METAL-CUTTING **BAND SAWS**

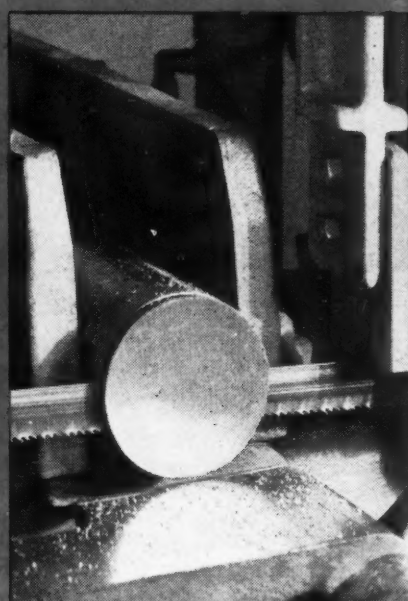
1 ... for Heavy, Straight
Production Cuts



2 ... for Contour-Sawing
of Jigs and Dies



3 ... for Cutting Off Bar
Stock & Large Sections



Set free your millers, shapers, lathes, broaches and drill presses *for their own work*. Use metal-band-sawing machines — and Simonds Hard Edge Bandsaws — for the types of work shown above, and many other jobs.

Simonds Hard-Edge Metal-Cutting Bandsaws are made of special electric steel poured to Simonds' own specifications to stand the shocks and strains of this work *longer than any alloy steel*. Then, too, the rounded gullets and special tooth-set makes for smoother cutting and longer blade life on any of the jobs shown above — or any others. Ask your ISD for Simonds Hard-Edge Metal-Cutting Bandsaws ... also for Spring-Temper and Skip-Tooth Bandsaws, if your needs warrant. Or call the nearest Simonds office listed at the right.

SIMONDS
SAW AND STEEL CO.

FITCHBURG, MASS.


Other Divisions of SIMONDS SAW AND STEEL CO.
making Quality Products for Industry



BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.



"Son, we've got a world reputation to keep"

"When this tool is finished, it will carry the  mark. And that mark stands for quality in every machine shop in the world—from Detroit to Delhi, from Quebec to Capetown. When I came to work here 27 years ago, "Greenfield" was world famous for its threading tools. Yet those tools we made then were crude beside the ones you're working on right now. It's up to you, son, to keep making better and better tools so that when you're my age people will still be saying, 'You get more for your money when you buy from "Greenfield".' Good luck, son."



GREENFIELD

GREENFIELD TAP and DIE CORPORATION
GREENFIELD, MASSACHUSETTS

Behind Every GREENFIELD Product..

LARGEST MANUFACTURING CAPACITY



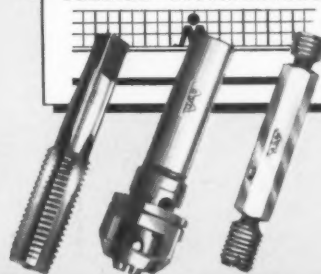
ENGINEERING AND RESEARCH



FIELD SERVICE MEN



LEADING DISTRIBUTORS





Precision

THREADING TOOLS

THE
GEOMETRIC
TOOL COMPANY . . NEW HAVEN 15, CONN.
*A Division of Greenfield Tap and
Die Corporation*

NO JIGS NEEDED

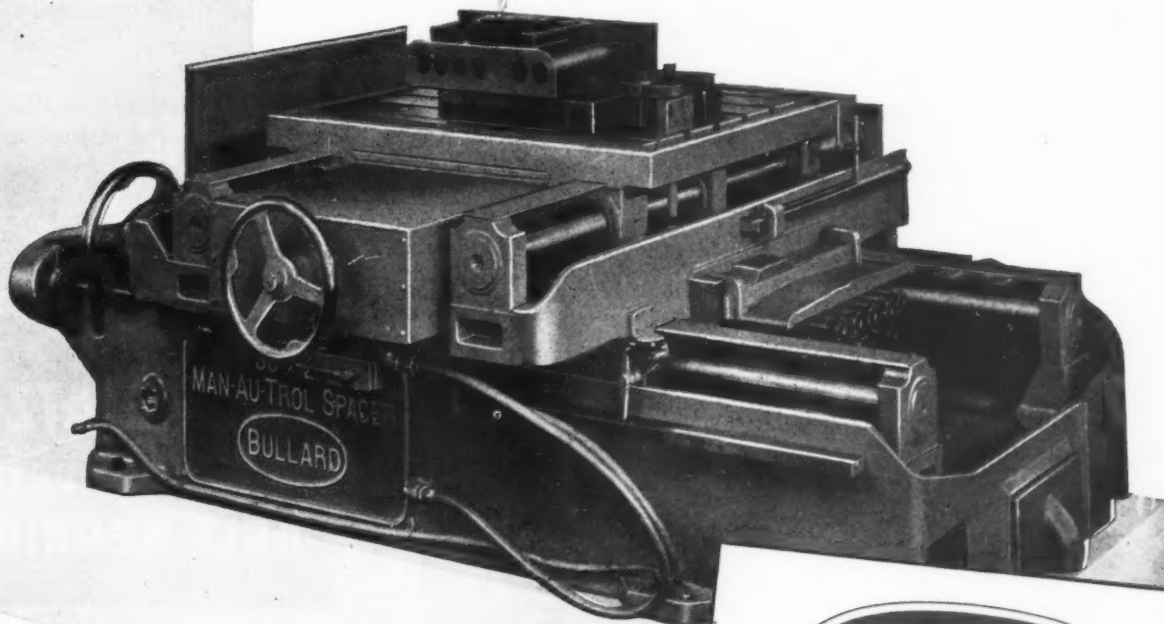
for drilling, boring, reaming and tapping

NEW Bullard MAN-AU-TROL Spacer Increases Speed and Reduces Cost of Drilling Operations

Now . . . with Bullard MAN-AU-TROL Spacers installed on your drills . . . you can start drilling, boring, reaming or tapping just as soon as your engineering drawings are ready.

Working from a master chart, the operator quickly, easily and accurately sets lateral and longitudinal position stops to match the specified pattern of holes. Then, the manually activated Spacer automatically repeats that pattern so that the holes are held *to the highest standard of commercial spacing accuracy*. Easy change-over from job to job and adaptability to an endless variety of work sizes and shapes makes the Spacer ideal for diversified shop schedules.

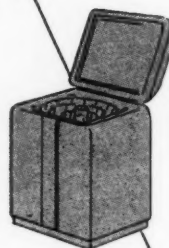
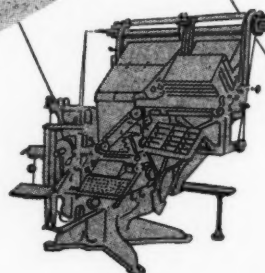
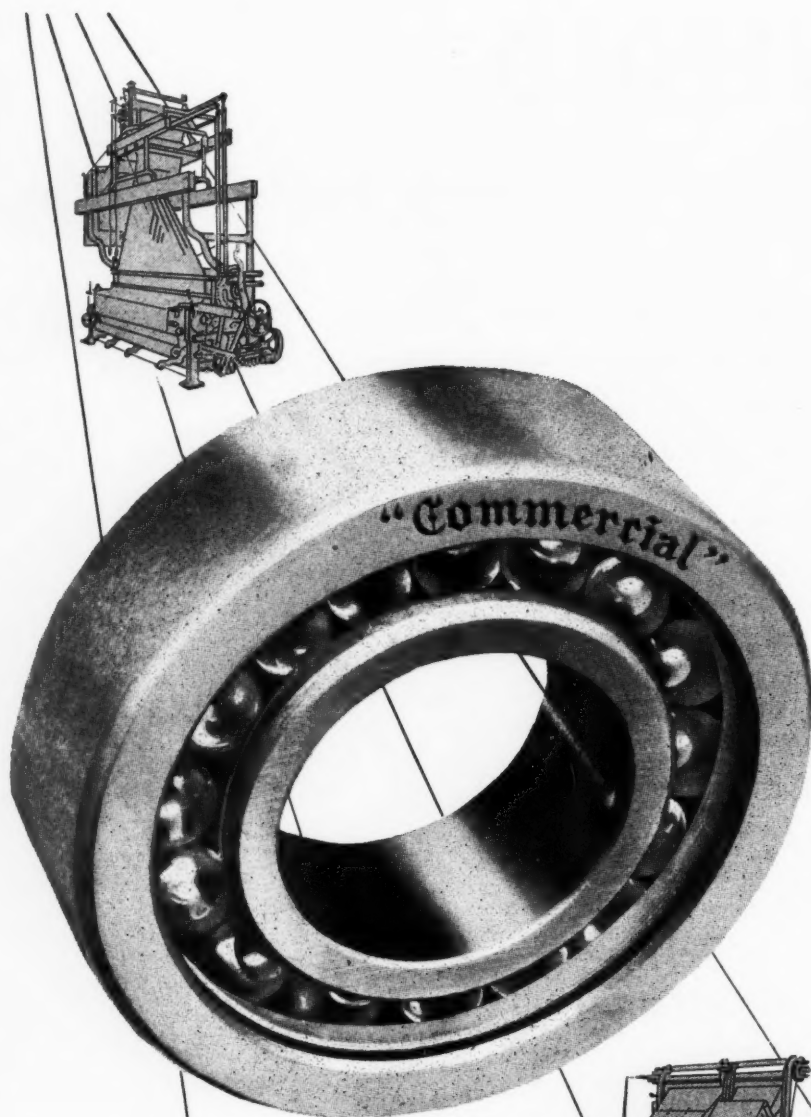
Consider the time, money and labor you will save when Bullard MAN-AU-TROL Spacers eliminate the need for designing, making, handling, repairing and storing hole-locating jigs. Write for MAN-AU-TROL Spacer Bulletin. The Bullard Company, Bridgeport 2, Connecticut.



Made in two sizes—30" x 20" (typical installation illustrated here) for larger work on 4', 5' and 6' Radial Drills, and 4" x 4" for smaller work usually done on sensitive drills.



**CREATES NEW METHODS
TO MAKE MACHINES DO MORE**



SCHATZ "COMMERCIAL" BALL BEARINGS have a knack for calling the turn wherever anti-friction performance is the need and low initial cost the problem.

Unlike other moderate-priced ball bearings, "Commercials" combine *through-hardened* chrome alloy precision balls and high-grade, carburized, hardened and tempered cold-rolled steel rings. What a difference this makes in added load capacity, resistance to fatigue and maintenance-free bearing life! That's why "Commercials" are equally at home in linotype machines and dishwashers, garage doors and jacquard looms, or in any bearing application which calls for day in and day out operating efficiency and economy.

Schatz "Commercials" cover the complete range of standard types and sizes ...are all alike in their low-cost, multi-purpose advantages. Fifty years of ball bearing specialization have seen to that.

Write "Schatz-Commercials" into your specs...then compare their on-the-job performance.

THE SCHATZ MANUFACTURING COMPANY

POUGHKEEPSIE, NEW YORK

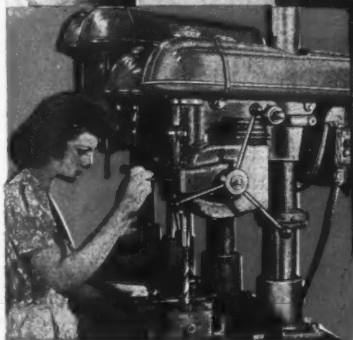
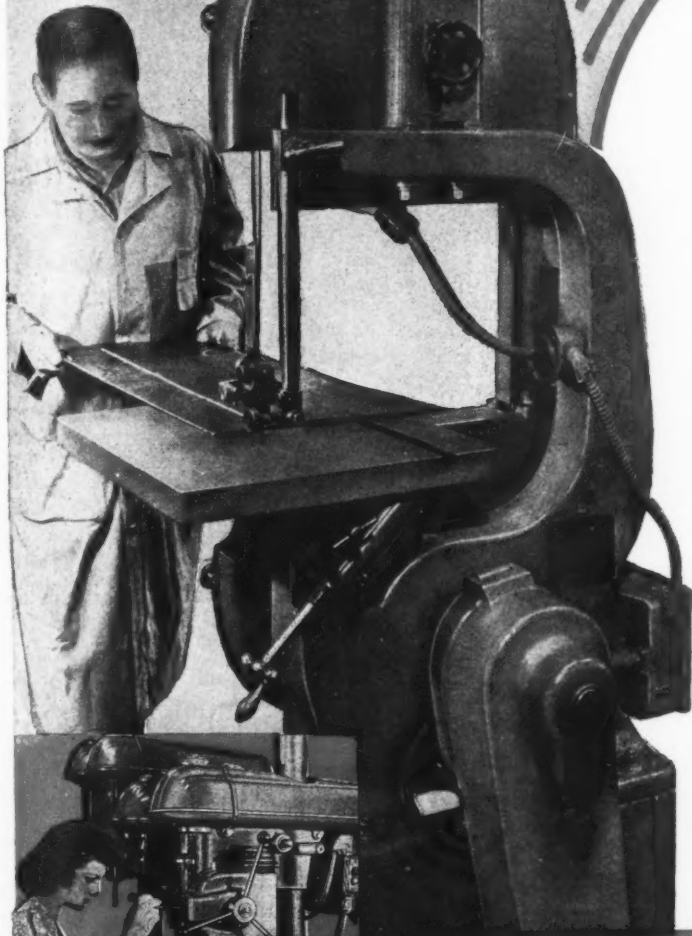
REPRESENTATIVES LOCATED AT

Detroit 2640 Book Tower-26
Chicago 8 S. Michigan Avenue-3
Cleveland 402 Sweetland Building-15
Los Angeles 5410 Wilshire Boulevard-36

SCHATZ
"Commercial"
BALL BEARINGS

The low-cost, multi-purpose ball bearing

**16" METAL CUTTING BAND
SAW — MBN1105**
Speeds: 70 to 2216
f.p.m.—Equipped with
mitre gauge grooves
—Price: Less base
and motor—\$191.50



**20" 4-SPINDLE POWER
FEED DRILL PRESS—
D1104F**

Spindle travel 6"—Speeds: 260 to
2600 r.p.m. with standard motors;
85 r.p.m. with special gear reduced
motor—*Price: less motors—
\$1314.00



**RADIAL CUT-OFF
MACHINE MRA 1120
OR MRA 1130**

21 1/2" ram travel—*Price:
With 2 or 3 h.p. geared mo-
tor, less base—\$446.00

*F.O.B. Plainfield—slightly higher west of the Rockies and in Canada

SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS

**walker-
turner**
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

MACHINE TOOLS

DRILL PRESSES—HAND AND POWER FEED • RADIAL DRILLS • RADIAL SAWS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

"Paid in Full"

Each of the Walker-Turner Machines shown on this page has long since "paid in full" its low initial cost in savings due to its increased production over the heavier and less flexible tools which they replaced.

In fact, the investment is so low that it is profitable to employ them as part time workers on jobs that were not completely mechanized before.

Used by the thousands on 24-hour day schedules for volume production during the past ten years, they are now being purchased to tool up for low costs in the competitive markets to come.

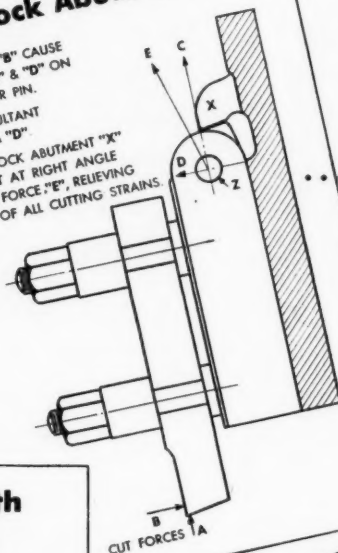
Plan your operations to speed up production in many directions with Walker-Turner Machine Tools—and use the guidance of your nearest Walker-Turner Distributor in helping you with the know-how.

Both in the Hypro rail head

... these exclusive Hypro dependable features

Exclusive Cincinnati Hypro Tool Block Abutment

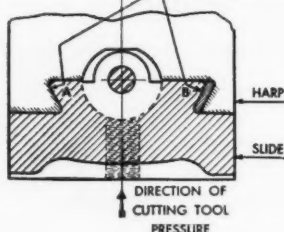
- (1.) CUT FORCES "A" & "B" CAUSE ACTING FORCES "C" & "D" ON CLAPPER BOX TAPER PIN.
- (2.) FORCE "E" IS RESULTANT OF FORCES "C" & "D".
- (3.) HYPRO TOOL BLOCK ABUTMENT "X" IS PRECISION FIT AT RIGHT ANGLE TO RESULTANT FORCE "E", RELIEVING TAPER PIN "Z" OF ALL CUTTING STRAINS.



Full Bearing Slides with Inverted Dove-tail

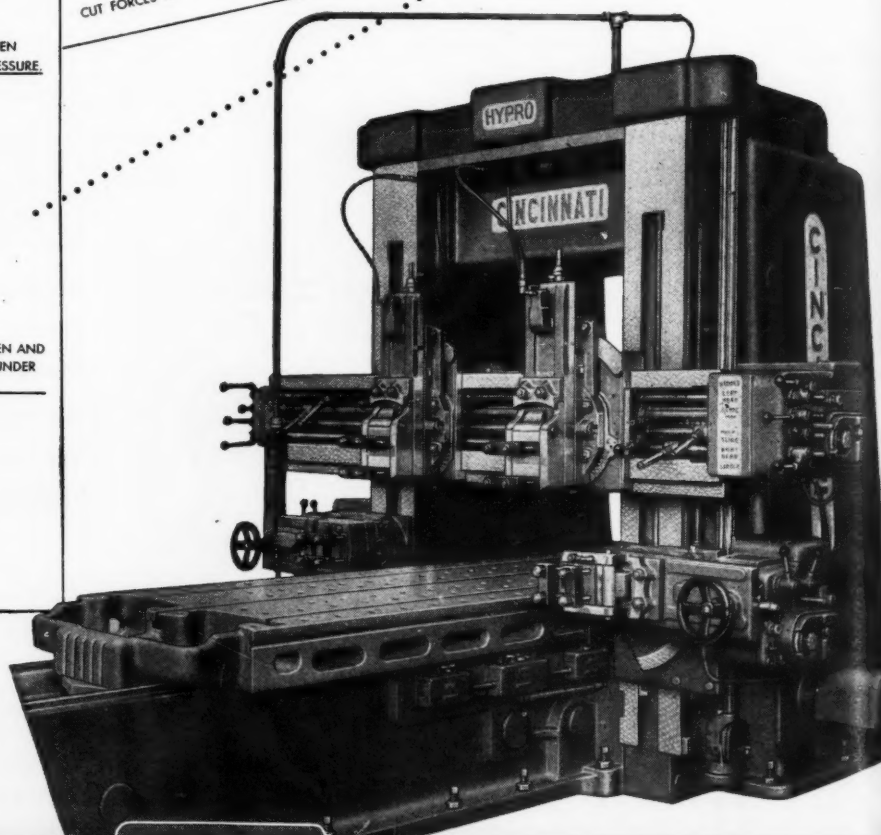
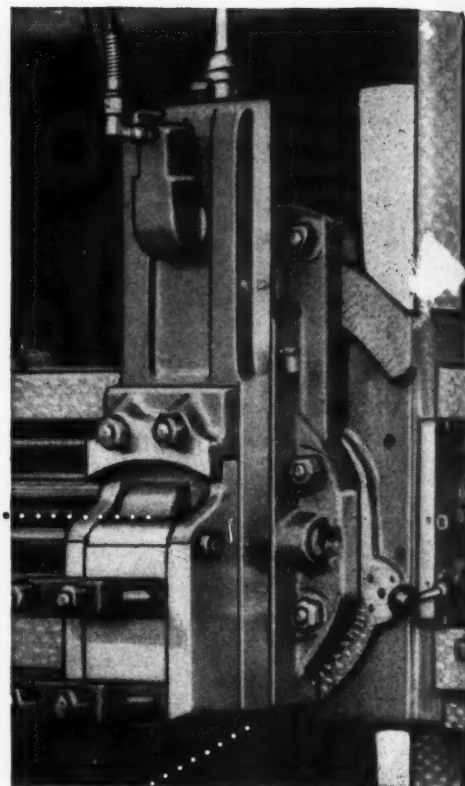
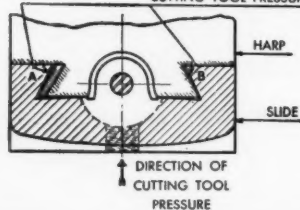
BEARINGS "A" & "B" TIGHTEN UNDER CUTTING TOOL PRESSURE.

CINCINNATI
HYPRO
NEW DESIGN



BEARINGS "A" & "B" LOOSEN AND SLIDE TENDS TO DEFORM UNDER CUTTING TOOL PRESSURE.

COMMON
SLIDE
DESIGN

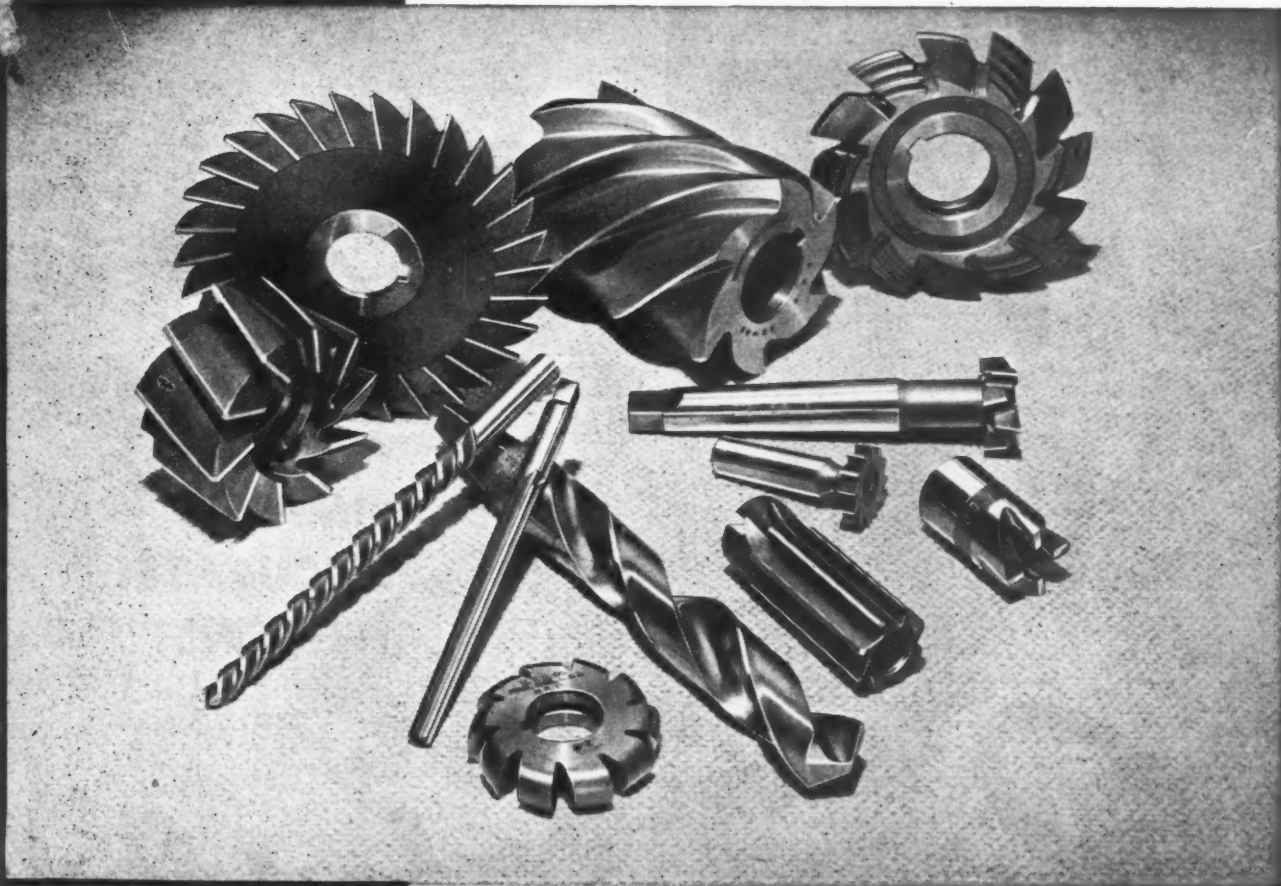


THE CINCINNATI HYPRO PLANER COMPANY

PLANERS - BORING MILLS - PLANER TYPE MILLERS

CINCINNATI, OHIO

Picture of Perfection



... by

UNION

They're able and accurate! . . . They're designed for precision and proved under production pressure! . . . They're pictures of perfection! . . . They're UNION — The Tools You Buy Again!

Butterfield Div., Derby Line, Vt.
Butterfield Div., Rock Island, Quebec
S. W. Card Mfg. Co. Div., Mansfield, Mass.

UNION TWIST
DRILL COMPANY
ATHOL, MASS.

UNION ★ BUTTERFIELD ★ CARD Divisions of the Union Twist Drill Co.

STORES:

New York: 61 Reade St. San Francisco: 121 Second St.
Chicago: 11 So. Clinton St. Los Angeles: 524 E. Fourth St.
Detroit: 5527 Woodward Ave. Seattle: 568 First Ave., South

MACHINERY, December, 1946—67



SIMPLE!
ACCURATE!
EFFICIENT!

Butterfield

Use this simple, accurate, efficient collet die on jobs where accuracy must be obtained with minimum attention. It is especially designed for high speed operation, for producing threads to a high standard of precision. The graduated micrometer lock nut makes it possible to split .001". Full floating construction assures accurately centered work.

Union . . . Butterfield . . . S. W. Card

Divisions of
the Union Twist Drill Company

BUTTERFIELD DIVISION

Derby Line, Vermont Rock Island, Quebec

**"THRED-RITE"
DIES AND
HOLDERS**

STORES: New York, 61 Reade St.—Chicago, 11 So. Clinton St.—Cleveland, Hal W. Reynolds, 3346 Superior Ave.—Detroit, 5527 Woodward Ave.—Los Angeles, 524 E. Fourth St.—Toledo, 3636 Detroit Ave.—Toronto, 137 Wellington St., West—Montreal, 111 St. Paul St., West—Winnipeg, 212 Bannatyne Ave.—Vancouver, 119 Pender St., W. Agents for Great Britain: Charles Churchill & Co., Ltd., 27-34 Walnut Tree Walk, Kennington, London, S. E. 11, England. Branches at Birmingham, Manchester, Glasgow, Newcastle-on-Tyne and Bristol.



SYNONYM FOR
quality

When your threading jobs call for unvarying quality, choose the taps that have been synonymous with quality for over 70 years. The Card line is complete, so that you can take advantage of Card Quality on every tapping job.

Union . . . Butterfield . . . S. W. Card

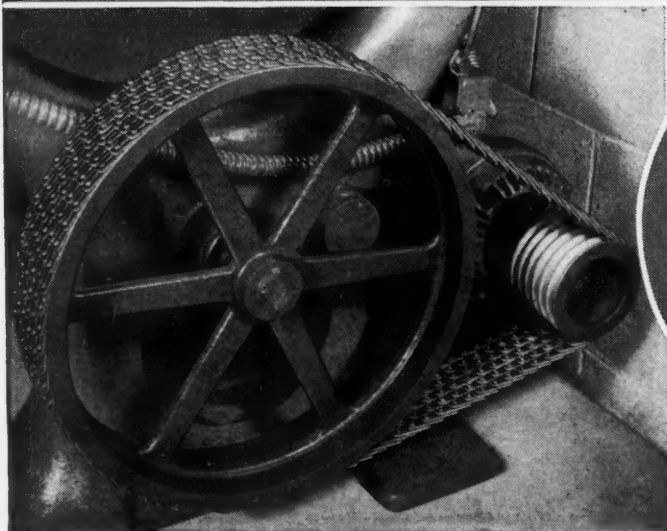
Divisions of
the Union Twist Drill Company

**S. W. CARD MFG. CO.
MANSFIELD, MASS.**

STORES: New York: 61 Reade St.; Chicago, 11 So. Clinton St.; Detroit, 5527 Woodward Ave.; Los Angeles, 524 E. Fourth St.; Seattle, 508 First Ave., South.

MACHINERY, December, 1946—69

He's got a choice of 316 sizes with only 4 reels of Veelos



JUST four reels of Veelos, the link V-belt, give you a choice of 316 *standard sizes* of industrial and fractional endless V-belts. With these four handy reels, a large costly inventory of endless belts is eliminated. Stock records are simplified. There are no spare V-belts to age and deteriorate.

Standard reels of Veelos hold 100 feet . . . require only minimum storage space. Belt replacements for any length drive are always on hand . . . always convenient to locate.

Veelos is quickly and easily installed on any drive. On drives with fixed centers or outboard bearings, it is installed without moving the motor or dismantling the machine . . . in just a few minutes. It provides substantial savings in installation and maintenance costs.

Veelos sales engineers are located in principal cities; 300 distributors throughout the country.

MANHEIM MANUFACTURING & BELTING CO.
MANHEIM, PENNSYLVANIA

VEELOS
THE LINK
V-BELT

Tested
Approved
Adopted
by American
Industry

Adjustable to any Length
Adaptable to any Drive

ROCKFORD

Metalworking

ROCKFORD

Production Ideas

December, 1946



Barber-Colman Long Bed Type A and Taper Spline Hobbing Machines for Tractor Spline and Gear Production at Caterpillar Tractor Company, Peoria.

AMERICAN BROACH & MACHINE CO. ★ ANDERSON BROS. MFG. CO. ★ BARBER-COLMAN COMPANY
Div. of Sundstrand Machine Tool Company

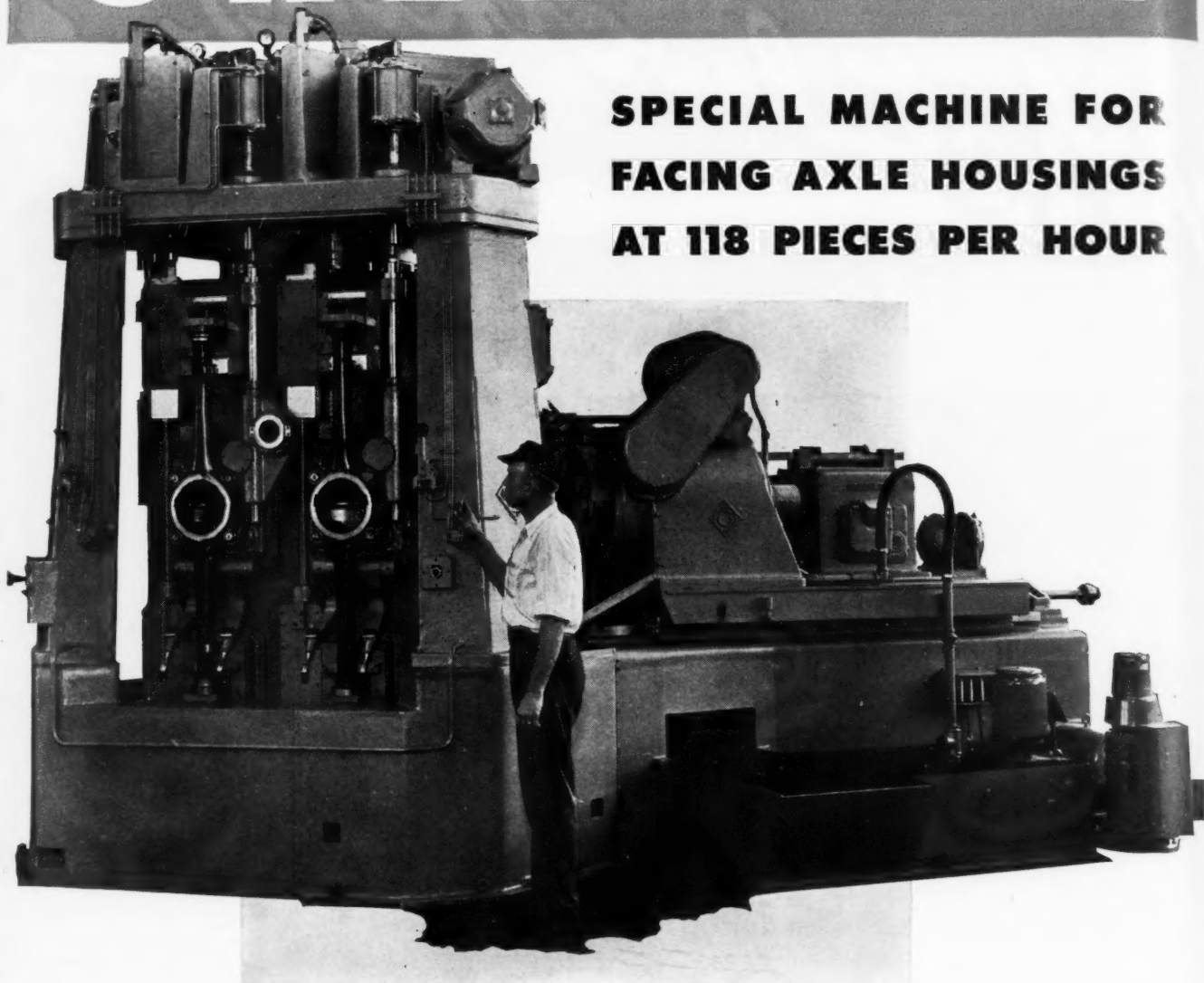
BARNES DRILL CO. ★ JOHN S. BARNES CORP. ★ W. F. & JOHN BARNES CO.

GREENLEE BROS. & CO. ★ MATTISON MACHINE WORKS ★ REHNBERG-JACOBSON MFG. CO.

ROCKFORD CLUTCH DIVISION ★ ROCKFORD MACHINE TOOL CO. ★ SUNDSTRAND MACHINE TOOL CO.
Boag-Winner Corporation

GREENLEE

SPECIAL MACHINE FOR FACING AXLE HOUSINGS AT 118 PIECES PER HOUR



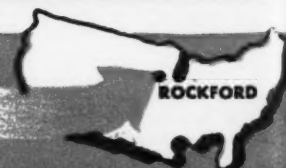
**GREENLEE
BROS. & CO.**
1872 MASON AVE.
ROCKFORD, ILLINOIS



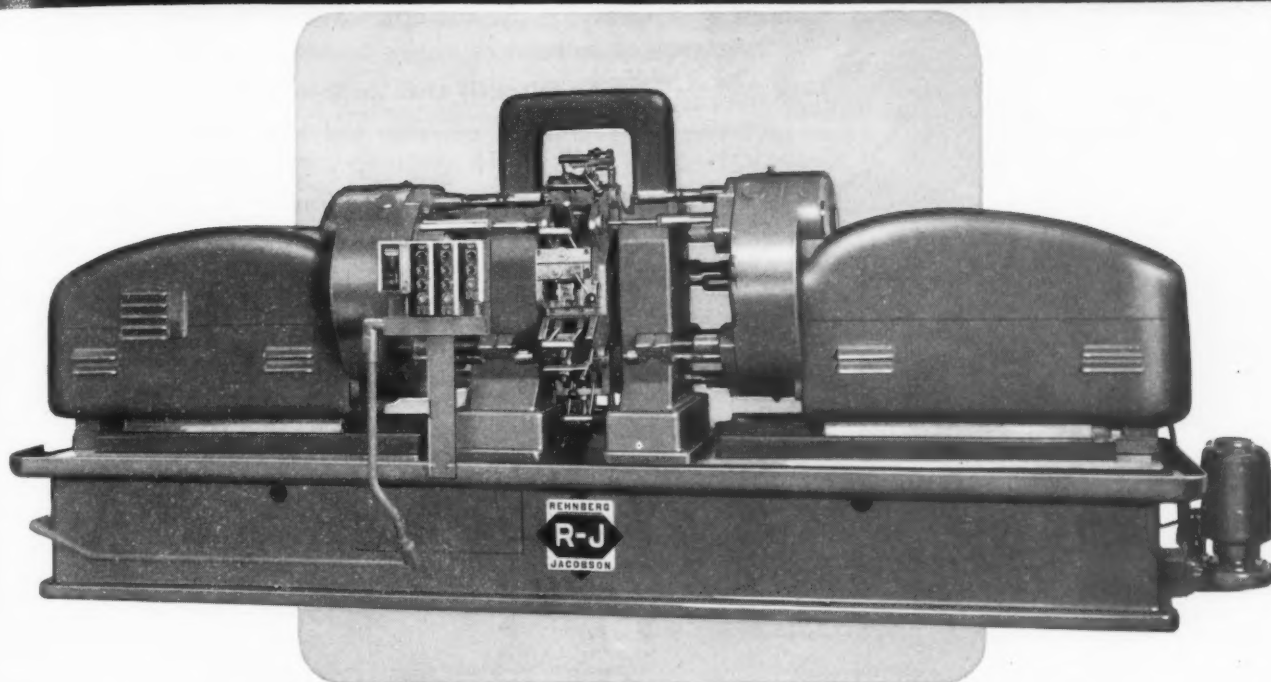
There are several distinctive features about this new machine which are typical of Greenlee versatility in building special machinery. *First* is the automatic, power-indexing, three-sided turret with one station for loading two pieces, one working, and one unloading. Two operators handle the machine, one loading and the other unloading the two work pieces. *Second* is the manually controlled, air-operated fixtures for centering and clamping the work pieces. These pieces are "twisty", and are difficult to line up and hold accurately except by a carefully planned fixture arrangement of this kind. *Third* is the tooling, which employs both roughing and finishing tools working simultaneously. There are two spindles carrying cat-heads which are mounted on a single hydraulically operated feed unit. The tool bits are cross fed, with the finishing bit following the roughing bit. The production on this machine (118 pieces per hour at 80% efficiency) is typical of the results that are being obtained with Greenlee machines especially designed and built to meet production requirements and cut costs.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

MADE IN
ROCKFORD...TESTED ENGINEERING AND CRAFTSMANSHIP
ILLINOIS, U.S.A.



Rehnberg-Jacobson



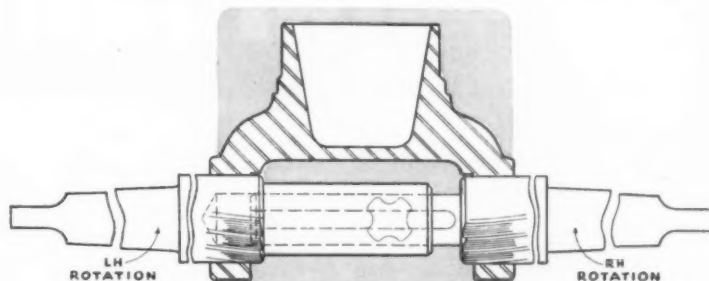
TWO-WAY MACHINE FOR DRILLING, REAMING, FACING AND CHAMFERING 12 DIFFERENT UNIVERSAL JOINT YOKES



Our problem, in this instance, was to design and build an accurate, high-production machine capable of handling 6 different sizes of 2 different types of Universal Joint Yokes. The machine is a two-way horizontal 8-station unit with automatic index. The work-piece material is SAE 1045 steel forging with a dense, tough structure. To prevent distortion of thin sections, drilling is done in 4 steps — drill part-size part way, drill part-size through, drill full size part way, drill full size through. This is followed by rough reaming, combination face and chamfer, and the unusual finish line-reaming described below. Fixtures are hand-clamped, locating accurately from a previously-broached hole and surfaces, and are fitted with adapters to take the two types of pieces. Tooling, which works from both sides simultaneously, is driven by Rehnberg-Jacobson self-contained *electronic* sliding head power feed units. Production rating of the machine, depending on work size, is from 240 to 300 pieces per hour.

INGENIOUS TOOLING FOR LINE REAMING

To accomplish the finish line-reaming in the same time as any other operation, and thus prevent slowing of production, an unusual type of tooling is employed. One right-hand and one left-hand reamer are used, specially made with telescoping pilots as illustrated in the drawing. The male pilot has chip and dirt clearances and wear is prevented by turning both reamers in the same direction. Engineers have acclaimed this unique arrangement as a simple and practical solution of a potentially time-wasting situation.



REHNBERG-JACOBSON MFG. COMPANY

DESIGNERS & BUILDERS OF
SPECIAL MACHINERY



2135 KISHWAUKEE ST.
ROCKFORD, ILLINOIS



MADE IN

FOR RIGID ACCURACY IN MACHINE TOOLS... **ROCKFORD**

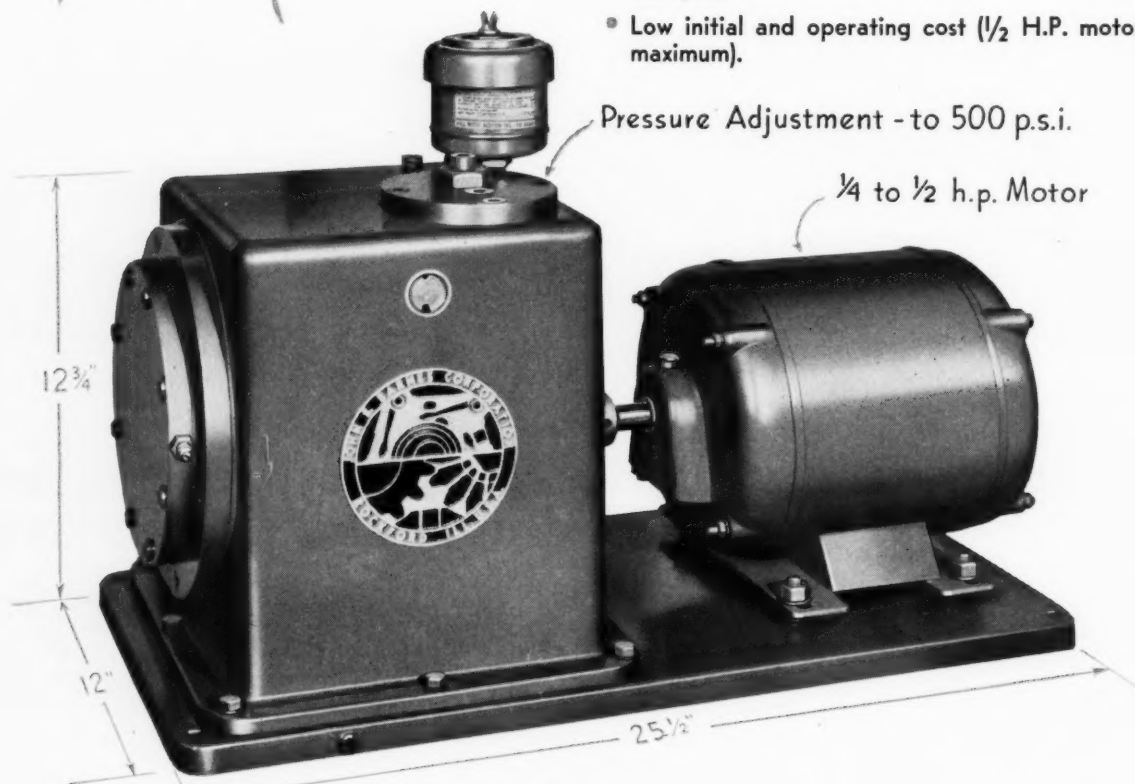
ILLINOIS, U.S.A.

**IT'S
NEW!**

BARNES

Hydraulic Clamp Unit

- An extremely small, compact, self-contained unit.
- For rapid operation and high holding pressure (500 p. s. i.).
- Greater economy and efficiency for chucking and clamping.
- Low initial and operating cost ($\frac{1}{2}$ H.P. motor—maximum).



RAPIDRAULIC JUNIOR

You'll find plenty of applications for this new Hydraulic Clamp Unit in your plant.

For actuating lathe chucks—clamp cylinders for fixtures—many other applications requiring a large volume of fluid in an extremely short time interval—then a high maintaining pressure.

The initial cost is small. The operating cost is extremely low . . . and you'll be amazed at what it will do to increase your production.

Write today for complete details regarding this newest Barnes Hydraulic development. Ask for Bulletin describing the Rapidraulic Junior Clamp Unit.

John S. Barnes Corporation, 301 S. Water St., Rockford, Ill.

Complete, Compact, HIGH-PERFORMANCE Hydraulic Units

**MADE IN
ROCKFORD**...FOR MACHINES DESIGNED TO SUIT YOUR PRODUCTION

ILLINOIS, U.S.A.

Machinery, December, 1946





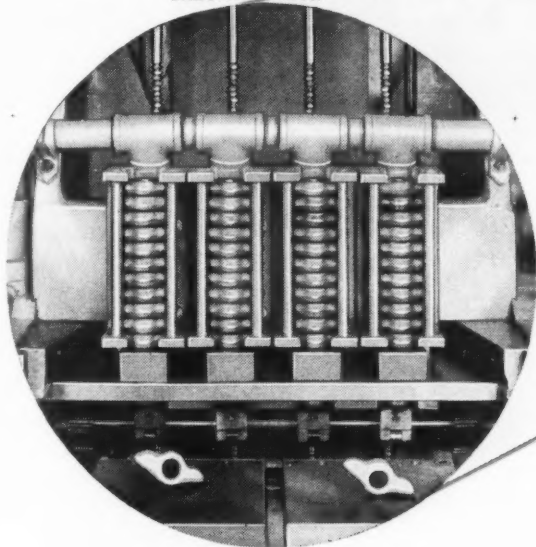
See American First

For Automatic High Production Broaching

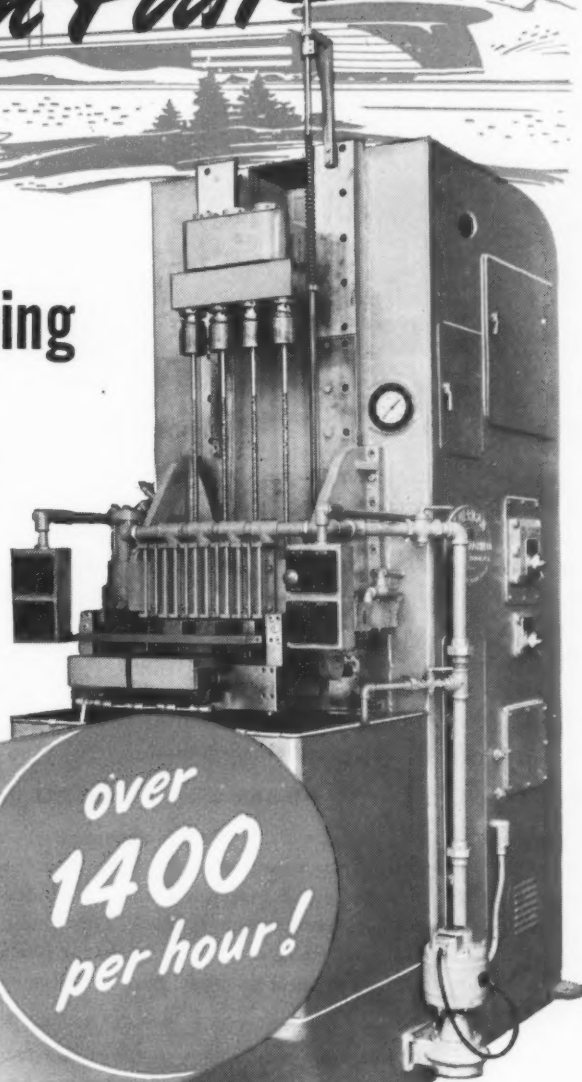
This *American* VP-4-20-36 Vertical Hydraulic Broaching Machine combines high productivity with fully automatic operation. Very little skill is required; all the operator need do is keep the loading magazines filled. Eight steel forged cam parts, previously coined and pierced with $\frac{3}{4}$ " diameter hole, are broached at each cycle, removing $\frac{1}{32}$ " stock and producing more than 1400 parts per hour.

The machine takes the parts from the loading magazines, moves them into broaching position, and, after broaching, discharges them onto a conveyor belt which carries them to the next operation. The hydraulically operated work slide is electrically controlled and interlocked with the machine cycle.

American pioneered the development of the pull-up type broaching machine. This particular machine is but one example of *American's* leadership in all branches of the broaching field—machines, tools, engineering. On all your broaching needs—see *American* first.



Close-up of operating fixture (above) shows four loading magazines filled with parts which are automatically moved into broaching position, broached, and discharged. Eight completed parts are produced per cycle, two being broached at each of the four stations. Two of the completed parts are displayed on the front of the work table. Because of its particular shape, the above part is manually loaded into the magazine. However, some parts, where the shape allows, are loaded into hoppers from which they are automatically clamped into broaching position.



over
1400
per hour!

MEMBER
**BROACHING TOOL
INSTITUTE**

American
**BROACH AND
MACHINE CO.**

ANN ARBOR, MICHIGAN

**BROACHING MACHINES
PRESSES**

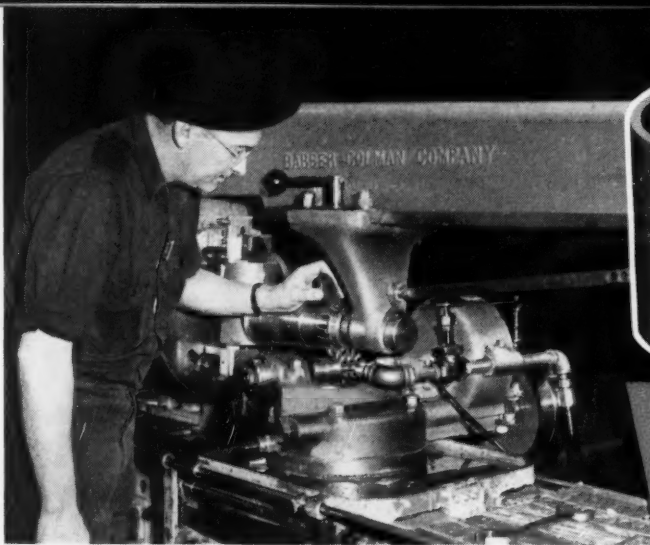
**BROACHING TOOLS
SPECIAL MACHINERY**



ROCKFORD

MADE IN

CENTER OF MACHINE TOOL EXCELLENCE...**ROCKFORD**



THIS JOB DEMANDS PRECISION INDEXING FROM MACHINE . . . PRECISION FORM CUTTING FROM HOB

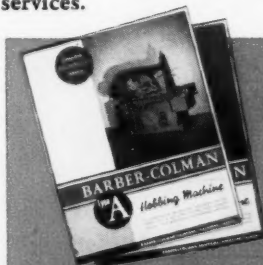
Cutting 16 highly accurate involute splines straight and parallel in tough heat-treated steel is just another job on the Barber-Colman Type A Hobbing Machine. On this landing gear strut, accuracy in *tenths* is combined with an excellent smooth finish on a production schedule of 32 to 35 finished pieces per 8 hour shift, on 2 machines.

The keys are 9/32" deep and 1-25/64" long, and they are finished in one cut in SAE 4130 steel, Rockwell 36-41 C, using Barber-Colman Elongated Tooth Hobs. A sliding fit on the outside diameter and the sides of the keys is required.

FLEXIBLE GEAR HOBBER . . . EASY TO SET UP

Spur gears . . . helical gears . . . worms . . . worm gears . . . spline shafts . . . sprockets . . . any evenly spaced form . . . can be hobbled on the Barber-Colman Type A Machine with an *absolute minimum* of set-up time and a maximum of *precision*. This machine is so rigidly built throughout its operating parts that it has a reputation as a dependable, general-purpose gear machine for heavy production work.

Extra tooling attachments are available to adapt this machine to other special classes of hobbing work. Whether you have spline shaft jobs, as illustrated, or conventional gears in your shop, experienced Barber-Colman Engineers can help you simplify your job set-ups by recommending the B-C Type A *General-Purpose* Hobbing Machine for your gear production. Write for their free services.



Free

FREE . . . write for bulletins F-1099 and F-1409 describing the Barber-Colman Type A Hobbing Machine and special equipment, giving specifications and other data.

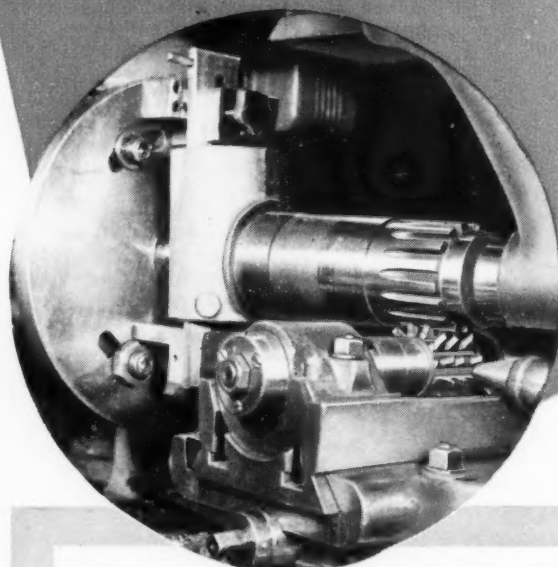
HOBGING MACHINES,
HOBBS, HOB SHARPENING
MACHINES, REAMERS,
REAMER SHARPENING
MACHINES, MILLING CUT-
TERS, SPECIAL TOOLS

BARBER-COLMAN COMPANY

GENERAL OFFICES AND PLANT • 109 LOOMIS ST. • ROCKFORD, ILL., U.S.A.



±.0005" SPLINE KEY
Accuracy in
**TOUGH HEAT
TREATED STEEL**



JOB RECORD

Name of part — Landing Gear Strut.
Material — SAE 4130, Rockwell 36-41 C, heat-treated.
Operation — Hobbing 16 key splines, 1-25/64" long; 3.742/3.743" O.D.; 3.180/3.171" root dia.; .360/.361" key width.
Hobbing Machine — Barber-Colman Type A Hobbing Machine.
Feed — .035" per rev. of work.
Speed — 40 r.p.m.
Holding Method — Between centers on special driving fixture.
Production — 32 to 35 pieces per 8 hours (2 machines)
No. of Pieces per Grind — 10 to 13.
Accuracy — Key ±.0005"; sliding fit on outside diameter and sides; plug gauge used for fit and concentricity.

MADE IN
ROCKFORD...FOR ACCURATE, FAST METAL REMOVAL



For the SPECIAL DRILLING and TAPPING JOB...

**BARNESDRIL PRODUCTION UNITS INCREASE
MARGIN OF PRODUCTIVITY AND LOWER COSTS**

This prominent washing machine manufacturer secured increased production with resultant lowered manufacturing costs using two special **BARNESDRIL** Production UNITS for drilling and tapping miscellaneous holes in transmission cases.

One **BARNESDRIL** Production UNIT performs both vertical and horizontal drilling and tapping operations on one side of the workpiece. The second **BARNESDRIL** Production UNIT performs similar machining operations on the other side of the part.

BARNESDRIL PRODUCTION UNITS FLEXIBILITY AFFORD GREATER ECONOMIES

Completely self-contained, **BARNESDRIL** Hydraulic Production UNITS have an unusual flexibility which permits their arrangement in any single or combinations of vertical, horizontal or angular positions; or they can be grouped around a rotating indexing table or drum for the most efficient handling of the work. Complete machines for either *standard* or *special* drilling, reaming, facing, boring and or tapping operations are designed and built for your specific requirements.

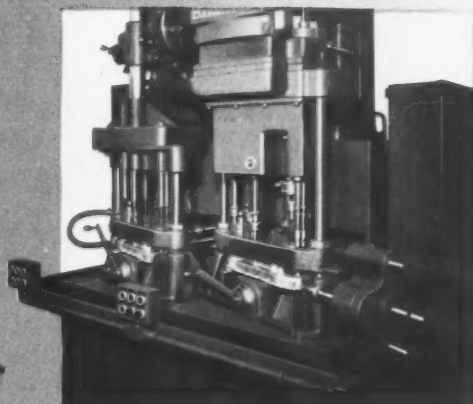
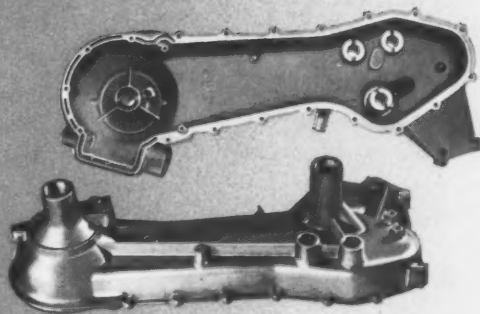
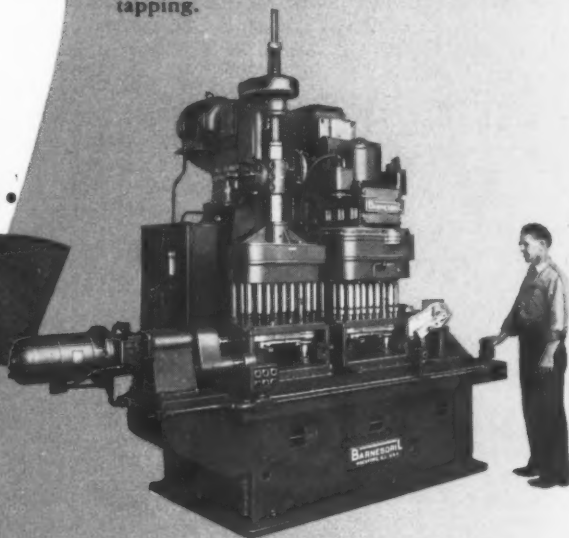
BARNESDRIL engineers can assist you with practical solutions for your special metal working jobs... giving you maximum production with reduced costs. There is no obligation for this service.

**GET THIS
BULLETIN**

...which describes **BARNESDRIL** Hydraulic Production UNITS and their application to a variety of jobs. Send for Bulletin No. 150-M available without charge.



This **BARNESDRIL** Production UNIT is equipped with one vertical 23-spindle drilling head; one vertical 23-spindle tapping head; and two horizontal 2-spindle heads, one for drilling and the other for tapping.



Close-up of spindle arrangement on second **BARNESDRIL** Production UNIT, equipped with one vertical 8-spindle drilling head; one vertical 8-spindle tapping head; and three horizontal 2, 3 and 4 spindle heads for drilling and tapping.

Barnes Drill Co.

814 CHESTNUT STREET

ROCKFORD
ILLINOIS, U.S.A.

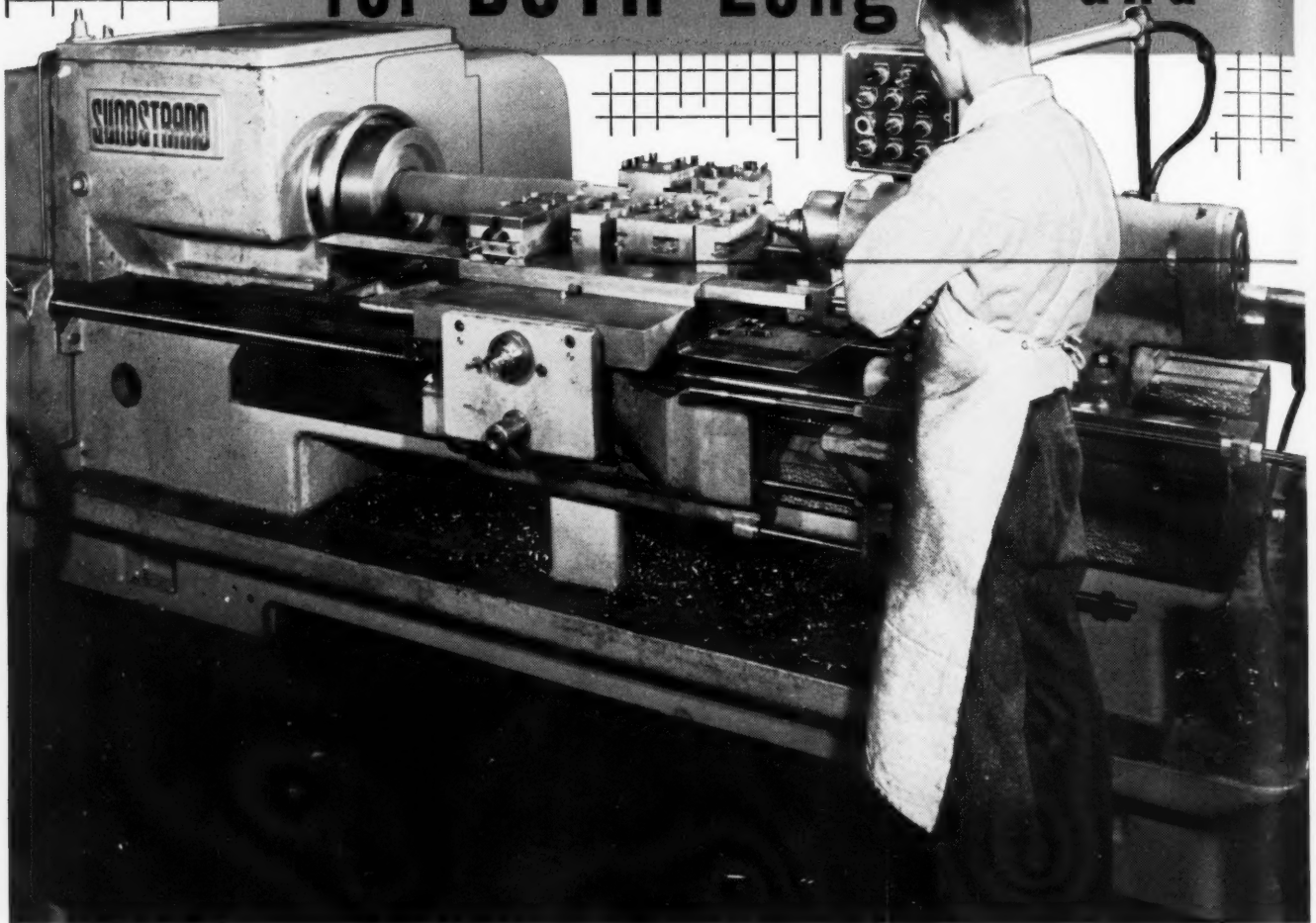


MADE IN

YOU'LL FIND YOUR PRODUCTION MACHINE TOOLS IN... **ROCKFORD**

NOW! ... a 75 H.P. Automatic

for BOTH Long and



PERFORMANCE —

The following cutting data reveals powerful possibilities of this new machine:

PART — X-1335 Steel Billet 8" dia. x 40" long

SPEED — 190 RPM — 400 SFM

DEPTH OF CUT — 1"

FEED — .045 per rev.

METAL REMOVED — 183.8 cu. in./min.

HP CONSUMED — 111

RATIO OF HP TO METAL REMOVED—
1.65 cu. in. per HP

TOOL—T. C. Tipped

PART—Tractor Steering Clutch Shaft

MATERIAL—N. E. 8749 Steel Forging

HARDNESS — 285 Brinell

OPERATION — Rough Turn, Face
and Form Long End

SPEED — 190 RPM (120 to 420
RPM Speed Range of Machine)

FEED — .38

METAL REMOVED — 18 pounds

HP CONSUMED — 79 (max. at
peak load)

CYCLE TIME — 60 sec.

TOOLS — (8) T. C. Tipped

PART — Track Sprocket Shaft

MATERIAL — 1045 Steel Forging

HARDNESS — 212 Brinell

OPERATION — Rough Turn, Face and
Form One End

SPEED — 229 RPM

FEED—.038 Front Slide, .015 Rear Slide

DEPTH OF CUT — Max. 7/8"

METAL REMOVED — 25 pounds

HP CONSUMED — 84 (max. at peak
load)

CYCLE TIME — 75 sec.

TOOLS — (9) T. C. Tipped



RIGIDMILS

FLUID-SCREW RIGIDMILS

AUTOMATIC LATHES

HYDRAULIC EQUIPMENT

MADE IN

ROCKFORD...MACHINE TOOL SHOPPING CENTER



Lathe

Short Runs..

NEW MODEL 16 LATHE HAS ALL SUNDSTRAND LATHE FEATURES WITH 75 H. P. SPINDLE MOTOR..

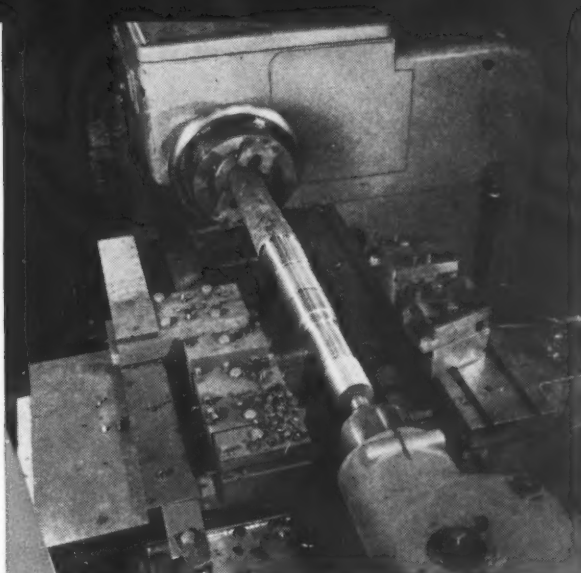
Yes, this new heavy duty lathe (17" swing over slides) has the same quick cycle change-over features as all other Sundstrand automatic lathes. It also has the same simplicity in adjustments, wide range of carriage cycles, wide range of feeds and speeds, high rapid traverse rate and a 75 horsepower spindle motor.

It handles large work as quickly and easily as smaller Sundstrand lathes.

If you have heavy turning jobs in long or short runs, or both, check into this highly productive automatic lathe. Its time saving capabilities can turn costly, cumbersome jobs into profitable ones.

FREE DATA coming off the press

This new booklet will give you specific data on the many outstanding features of this new heavy duty automatic lathe. Specifications, complete cycle data, and description of the Sundstrand quick cycle change-over are all included. Write for your copy today. Ask for bulletin No. 655.



Above — Rough turning one end of track sprocket shaft using 9 carbide tipped tools.

Below — Turning tractor steering clutch shaft using 8 carbide tipped tools.



SUNDSTRAND MACHINE TOOL COMPANY

2530 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES



ROCKFORD MADE MEANS PRECISION MADE...

MADE IN
ROCKFORD
ILLINOIS, U.S.A.

HOW FINE A PITCH DO YOU REQUIRE

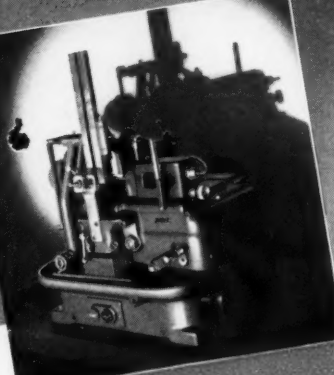
for GEARS
and PINIONS?

STANDARD BARBER-COLMAN
SMALL FINE PITCH HOBS UP TO
250 PITCH, MADE TO .0005" LIMITS

Precision small spur gears and pinions required for clocks, watches, meters, cameras and other fine instruments are now manufactured to .0005" limits rapidly and economically by hobbing. The Barber-Colman Type S Automatic Hobbing Machine, using B-C Small Fine Pitch Hobs, produces gears and pinions with accurate tooth profile, *which are absolutely interchangeable*, and capable of smooth operation under severe conditions.

Barber-Colman Small Fine Pitch Hobs are manufactured from 30 pitch to 250 pitch for cutting a wide variety of special forms . . . ratchets, clock forms and escape wheels . . . as well as standard involute gear tooth forms. These hobs are made ground or unground, straight or taper bore and shank type. Ground hobs are standard up to 200 pitch, unground hobs can be made as fine as 250 pitch. These exceptionally fine cutting tools are made from selected high-speed steels, and manufactured by Barber-Colman master craftsmen to limits measured in "tenths".

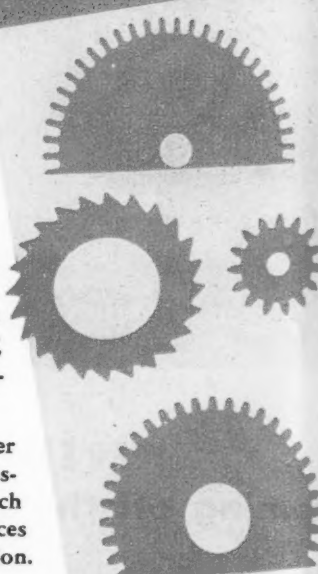
These extremely small precision watch gears—contrasted with an ordinary pin—are .0663" diameter by 1/32" width. They are hobbed with unground B-C small fine pitch hobs, 268 pitch, on a B-C Type S Automatic Hobbing Machine.



B-C small fine pitch hobs are designed especially for use with the Barber-Colman Type S Automatic Hobbing Machine—a high speed, continuous hobber for small gears and pinions. A completely modern tool with magazine work loading and automatic cycle. Details on this precision machine gladly sent upon request.

Here are some typical results being obtained from B-C Small Fine Pitch Hobs, taken directly from the field . . . cutting 200 precision small gears per hour, with 600,000 gears total hob life on brass . . . 640 precision brass gears per hour, with 102,400 gears per hob sharpening . . . 850 pieces per grind, cutting 18 tooth, 180 pitch steel pinion gears.

A Barber-Colman Field Engineer can show you the production possibilities of B-C Small Fine Pitch Hobs for your work. His services are available, without obligation.



FACTS ABOUT SMALL FINE PITCH HOBS . . .

This Bulletin tells the story of B-C small fine pitch hobs and what they can do in production hobbing of precision small gears and pinions. Your copy sent free upon request.

HOBBING MACHINES,
HOBS, HOB SHARPENING
MACHINES, REAMERS,
REAMER SHARPENING
MACHINES, MILLING CUT-
TERS, SPECIAL TOOLS

BARBER-COLMAN COMPANY

GENERAL OFFICES AND PLANT • 109 LOOMIS ST. • ROCKFORD, ILL., U.S.A.



MADE IN

ROCKFORD...CITY OF MACHINE TOOL SPECIALISTS

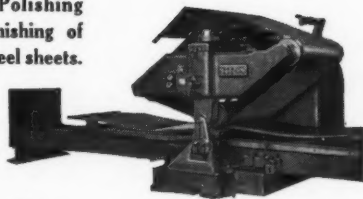
ILLINOIS, U.S.A.



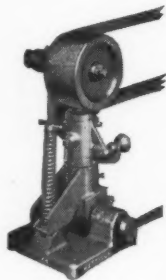
MATTISON

ABRASIVE BELT GRINDING AND POLISHING MACHINES

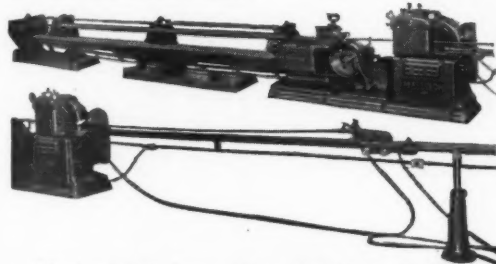
Mattison W-455 Wide Belt Grinding and Polishing Machine for finishing of wide stainless steel sheets.



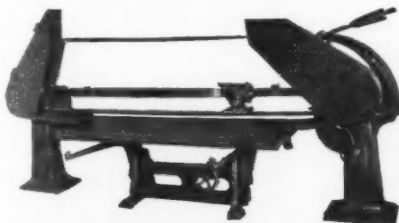
Mattison S-441 Grinding and Polishing Machine for flat and curved work. Can be furnished with or without special fixtures, depending on work ground.



Mattison J-400 Backstand Idler adapts regular polishing Jack to the use of factory-coated abrasive belts.



Mattison H-424 Internal Tube Grinding and Polishing Machine for finishing inside of metal tubes.



Mattison L-138 Grinding and Polishing Machine arranged for wet grinding.

★ Results obtained in a number of plants definitely establish the use of factory coated abrasive belts as a most efficient practice. Besides reducing the number of rejections and improving the finish, they have cut the polishing cost per piece through increased production.

However, to secure full benefit from factory-coated abrasive belts, the right type of mechanical unit is necessary. The machine is all important for properly applying the abrasive to the particular job to be done.

Mattison Abrasive Belt Grinding and Polishing Machines are engineered with a knowledge of the factors involved to give the best application of belts. From the time factory-coated abrasive belts were introduced for metal grinding and polishing, Mattison's have developed and built machines to provide best results.

Mattison Abrasive Belt Grinding and Polishing Machines are used for smoothing up welding marks, polishing solid parts—such as handwheels, levers, handles, steel sheets including stainless steel—and the inside of tubes. They are built for both the wet and dry grinding method. In addition to the finishing of metal parts, they are used for plastics, hardened rubber, fibre, glass, etc. In fact, the applications are so numerous, only a few can be mentioned and shown on this page.

Whatever your problems may be, it is well worth while to make an investigation as to the machine available for handling it.



SEND FOR **FREE** BOOKLET

Illustrates various applications of Mattison Grinding and Polishing Machines, built to secure best results from factory-coated abrasive belts. Also gives helpful data on grinding and polishing metals, plastics and other materials with abrasive belts. Write today for your copy.



MATTISON

MACHINE WORKS

ROCKFORD • ILLINOIS



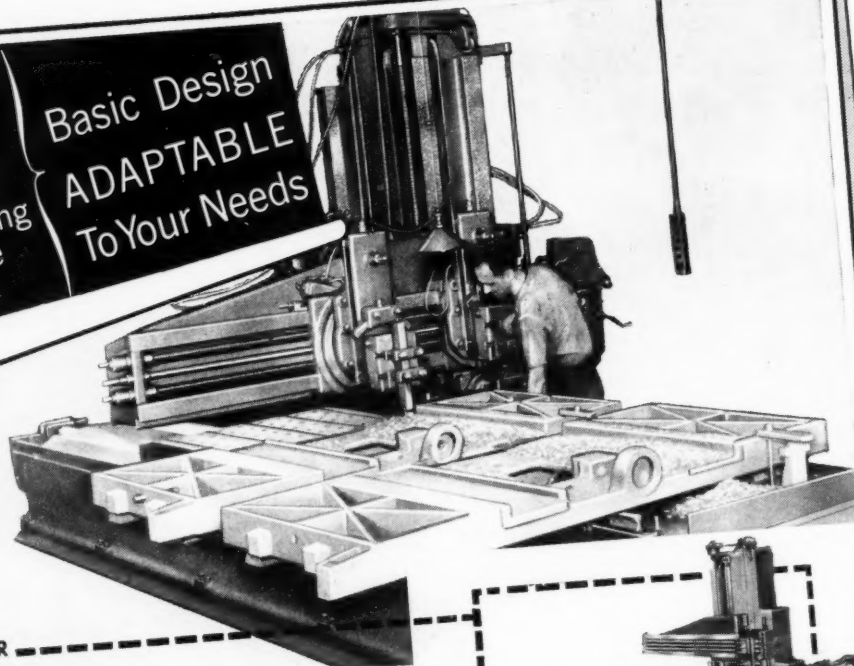
MADE IN

FOR PRODUCTION MACHINE TOOLS IT'S... **ROCKFORD**

Hy-Draulic

Rockford
Hy-Draulic
Reciprocating
Machine
Tools

Basic Design
ADAPTABLE
To Your Needs



PLANER

What Do You Want on the Cross Rail?

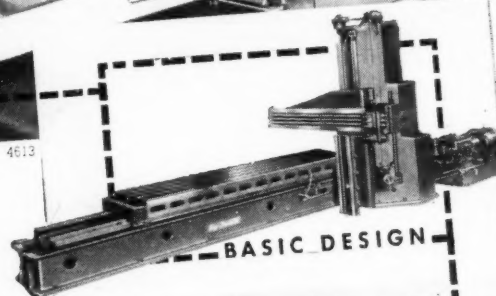
Rockford Hy-Draulic design is proving its basic soundness more fully each day. Because of it, as always, Rockford machines have powerful drives that are infinitely variable, fast, easily controlled, and smooth. Now the important feature of adaptability can be also demonstrated.

For example, the basic design of the machine shown here is normally used to build our standard Openside Planers. However, this basic Rockford Hy-Draulic design may also be applied to special machine design, such as to the grinder shown below. Whether the machine is built as a planer or a grinder, the same desirable operating advantages inherent in Hy-Draulic design are obtained.

More than ever before, machine tools today must give you better work at minimum machine time. Let us show you how a Rockford Openside Planer can improve your operations because it's Hy-Draulic. For special problems, let our engineering department show you how basic Rockford design can be applied. Rockford Openside Planers are described in Bulletin 450. Write for your copy.

ROCKFORD MACHINE TOOL CO.
ILLINOIS
ROCKFORD

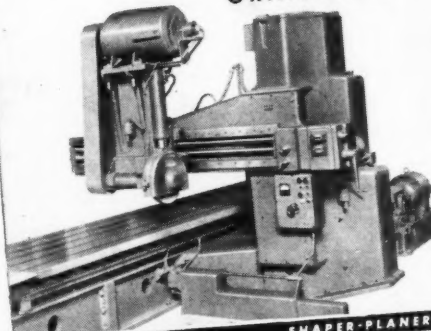
4613



BASIC DESIGN

Basic design of the Rockford Hy-Draulic Openside Planer (above) is adapted to the heavy duty high-speed grinder below. Major change is that grinder head replaces tool head.

GRINDER

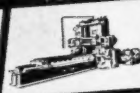


Hy-Draulic

SHAPERS



PLANERS



SLOTTERS



SHAPER-PLANERS



MADE IN

ROCKFORD...MACHINE TOOL PLANTS CLOSE TO YOUR PLANT





Here's Your Tubing

Quick Shipment from Large Ryerson Stocks

IN STOCK

Low Carbon, Cold Drawn Seamless
Mechanical Tubing
Regular and Pump Cylinder Finish

High Carbon, Cold Drawn Seamless
Mechanical Tubing

Structural Tubing—Hot Rolled,
Butt Welded

Boiler Tubes—Seamless and Electric
Resistance Welded

Allegheny Stainless Seamless Tubing—Type 304

Allegheny Stainless Seamless Pipe
Type 304—Standard and Extra Heavy Weight
Types 316 and 347 Standard Weight

Allegheny Stainless Welded Pipe
Type 304—Standard Weight

Hot Finished and Cold Drawn Alloy Steel Tubing
and Aircraft Quality Tubing Available from
Mill Only.

It's just what you ordered because we continually check the size-accuracy, concentricity and straightness of our tubular stocks.

Its surface is smooth and scale-free because close control over every manufacturing step, from selection of the highest grade billets, through piercing and drawing, to the finished tube, assures a top quality product.

You'll find that constant experimentation to improve machining qualities has paid off in good machinability within the limits of the analysis specified. In short, nothing is overlooked that will help you put this tubing to work as a finished part, quicker and with less waste.

Convenience is another advantage of Ryerson service on tubular products. Large, diversified stocks are on hand for prompt shipment in eleven completely equipped plants . . . providing next-door service most everywhere.

A Ryerson tubing specialist will work with you on all tubular requirements. Get in touch with the plant nearest you when you need tubing from stock.

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

RYERSON STEEL



**Your tooling costs can be cut
right now**

Here's How To Get More Output Per Grind, Longer Life From Your Tools!

First: Your tooling costs drop with every extra piece your tools produce per grind, every extra hour they stay on the job. That's why it pays you to use the Carpenter Matched Set Method of tool steel selection. This tried and proved method enables you to know *in advance* what performance to expect from the tool steel you use. Quickly and easily, it helps you select the tool steel best suited for the job. The result is longer tool life, more output per grind—lower tooling costs!

Second: For additional help in getting the kind of tool performance you want, get in touch with your nearby Carpenter representative. From the very start of your tooling job to its completion, he can give you all the information you need to put the Matched Set Method to work in your plant. So contact your Carpenter representative—just call your nearby Carpenter Warehouse or Distributor, today.

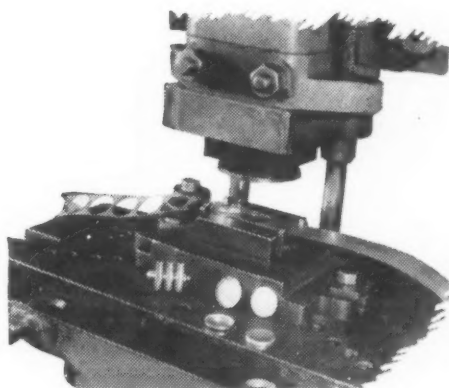


THE CARPENTER STEEL COMPANY, 105 W. Bern Street, Reading, Pa.

Use the Matched Set Method for Results Like This:

Hours of Machine Down-time Eliminated
Per Week: 11!

Extra Pieces Produced Per Grind:
550,000!



the Job:

Blanking and forming Thermostat Diaphragms from .008" thick phosphor spring bronze.

the Problem:

The nature of the material required tools with exceptionally sharp cutting edges. With the steel previously used, tools required too frequent regrinding and each time they were reground, 1½ hours of productive machine time were lost.

the Results:

The tool maker, using the Matched Set Method, went to Carpenter *Hampden* (Oil-Wear) for greater wear resistance. The new *Hampden* punch eliminated 11 hours of machine down-time each week and produced 550,000 additional diaphragms per grind!



Call YOUR NEARBY CARPENTER WAREHOUSE OR
DISTRIBUTOR TODAY FOR FAST DELIVERY OF --

Carpenter MATCHED TOOL STEELS

†Baltimore
†Birmingham, Ala.
†Boston
†Buffalo
†Chicago
†Cincinnati

*Cleveland
*Dayton
*Detroit
*Hartford
*Houston
*Indianapolis

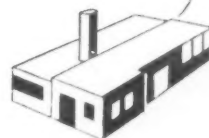
†Los Angeles
*New York
†Philadelphia
†Portland, Ore.
*Providence
*St. Louis

†San Francisco
†Seattle
†Worcester, Mass.
In Canada:
†Toronto and
†Montreal

*Carpenter Warehouse

†Carpenter Distributor

See Your Classified Telephone Directory



Carpenter

MATCHED TOOL STEELS

100% ACID DISC INSPECTED



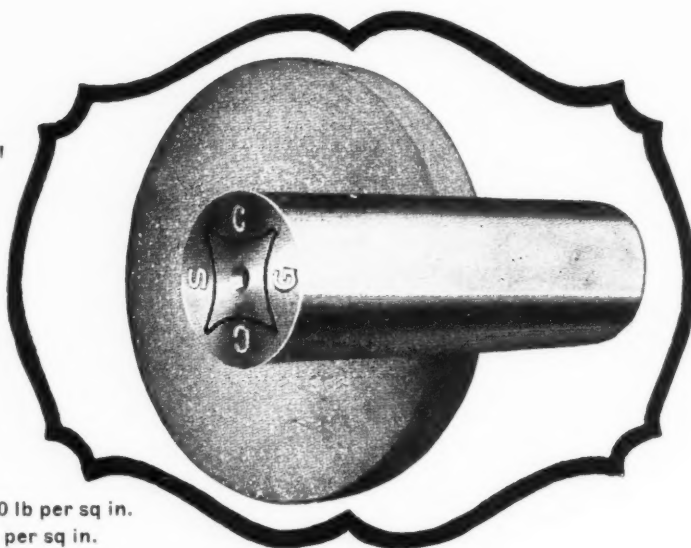
CUMBERLAND GROUND SHAFTS

An Exclusive Product made by an Exclusive Method

DIAMETERS 1-1/8" to 8"
INCLUSIVE

MINIMUM
ELASTIC
LIMIT

Cumberland Brand—30,000 lb per sq in.
Potomac Brand—45,000 lb per sq in.
Cumsco Brand—55,000 lb per sq in.



CONCENTRIC
STRAIGHT
ACCURATE

MAXIMUM
LENGTHS
MANUFACTURED

Year 1845—up to 16 feet
Year 1886—up to 25 feet
Year 1945—up to 70 feet

They are carefully ground to our standard manufacturing tolerance, plus nothing to minus .002" on diameters 1-1/8" to 2-7/16" inclusive . . . plus nothing to minus .003" on diameters 2-1/2" to 8" inclusive. Closer tolerance can be furnished, if desired.

IMMEDIATE SHAFTS

Distributed by

Baltimore, Maryland—Addison Clarke & Bro.
Boston, Mass.—Hawkrigde Brothers Company
Boston, Mass.—Brown-Wales Company
Bridgeport, Conn.—Hunter & Havens, Inc.
Buffalo, New York—Jos. T. Ryerson & Son, Inc.
Chicago, Ill.—Central Steel & Wire Co.
Cincinnati, Ohio—Jos. T. Ryerson & Son, Inc.
Cleveland, Ohio—The Bissett Steel Company
Dayton, Ohio—Central Steel & Wire Co.
Detroit, Michigan—Central Steel & Wire Co.
Fort Worth, Texas—C. A. Fischer
Hartford, Conn.—Hunter & Havens, Inc.
Indianapolis, Ind.—Tanner & Company
Jersey City, N. J.—Jos. T. Ryerson & Son, Inc.
Kansas City, Mo.—F. H. Turner
Lakeland, Fla.—Mine & Mill Supply Co.
Los Angeles, Calif.—Link-Belt Co., Pacific Div.

Louisville, Ky.—Neill-LaVielle Supply Co.
Martinsburg, W. Va.—W. H. Helston & Son
Montreal, Can.—Drummond, McCall & Co., Ltd.
New York City, N. Y.—Bright Steel Corp.
Oakland, Calif.—Link-Belt Co., Pacific Div.
Philadelphia, Pa.—Charles Bond Company
Philadelphia, Pa.—Horace T. Potts Co.
Pittsburgh, Pa.—McKee-Oliver, Inc.
Portland, Maine—W. L. Blake & Company
Portland, Oregon—Link-Belt Co., Pacific Div.
Providence, R. I.—Congdon & Carpenter Co.
Quebec, Canada—H. Duchene
San Francisco, Calif.—Link-Belt Co., Pacific Div.
Seattle, Wash.—Link-Belt Co., Pacific Div.
Spokane, Wash.—Link-Belt Co., Pacific Div.
Toronto, Canada—Drummond, McCall & Co., Ltd.
Worcester, Mass.—Pratt & Inman

CUMBERLAND STEEL COMPANY

CUMBERLAND, MARYLAND, U. S. A.
ESTABLISHED 1845 INCORPORATED 1892

streamline **YOUR PRODUCTION**

with

WYCKOFF
Heat Treated
COLD FINISHED STEEL

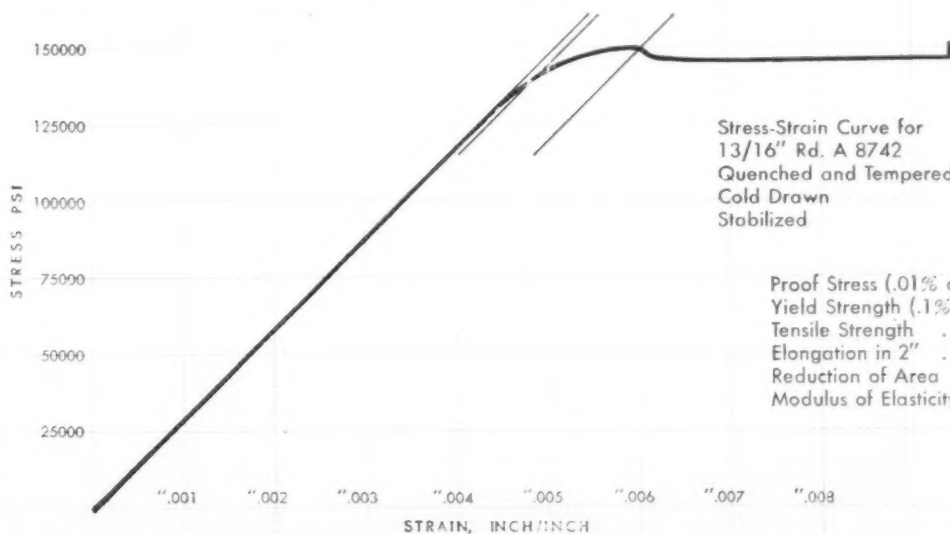
TAKE the heat treating, cleaning and straightening 'stops' out of the smooth flow of your parts production with Wyckoff Heat Treated Cold Finished Steel.

Machine your highly stressed parts from Wyckoff Heat Treated Steels that possess the required physical properties—without interrupting production to create these properties and without worry about distortion.

Wyckoff Heat Treated Steel is furnished to your individual requirements—gives pre-determined uniformity of production stock that makes every part machine the same . . . perform the same . . . eliminates laborious hardness testing of finished parts.



X 1000



Stress-Strain Curve for
13/16" Rd. A 8742
Quenched and Tempered
Cold Drawn
Stabilized

Proof Stress (.01% offset) 144,500 psi
Yield Strength (.1% offset) 151,000 psi
Tensile Strength . . . 152,500 psi
Elongation in 2" . . . 17.0%
Reduction of Area . . . 56.8%
Modulus of Elasticity . 29,300,000 psi

Wyckoff

STEEL COMPANY

FIRST NATIONAL BANK BUILDING, PITTSBURGH 30, PA.
3200 S. KEDZIE AVENUE, CHICAGO 23, ILLINOIS

Works at: AMBRIDGE, PA.; CHICAGO, ILL.; PUTNAM, Conn.; NEWARK, N. J.

Manufacturers of Carbon and Alloy Steels — Turned and Polished Shafting
— Turned and Ground Shafting — Wide Flats up to 12" x 2"



BETHLEHEM

Tool Steel Reference List

Bethlehem tool steels range from the straight-carbon types to the highly-alloyed, special-purpose grades so often required in modern practice.

Broadly speaking, the standard Bethlehem tool steels come under seven main headings. The following list is a general guide, and it includes the steels for almost every job in your plant:

CLASSIFICATION	TYPE ANALYSIS	TRADE NAMES
1. General-Purpose Tool and Die Steels (water-quenching)	{ C or C-V 0.70 to 1.40 carbon range	{ X; Best; XCL; Superior; XX
2. Safe-Hardening Tool and Die Steels (oil-quenching)	{ Mn-Cr-W-V Ni-Cr-Mo	{ BTR Bethalloy
3. Air-Hardening Tool and Die Steels (air-quenching)	{ Mn-Cr-Mo	{ AH; AH-5
4. High-Production Tool and Die Steels	{ High C, High Cr	{ Lehigh L; Lehigh H; Lehigh S
5. Shock-Resisting Steels	{ Si-Mn W Cr-V	{ No. 71 Alloy; Omega No. 67 Chisel Tough (H and M tempers)
6. Hot-Work Steels	{ Cr-Mo W	{ Cr-Mo-W; Cr-Mo-V No. 57 Hot Work; No. 57 Special Hot Work
7. High-Speed Steels	{ W W-Mo	{ Bethlehem Special High Speed; Comokut; Red Tiger (Improved) 66 High Speed; Moco; HM

Remember, our specialists are always ready to talk applications with you. Call us when tool-steel problems get tough—or better still, let us work with you from the start.

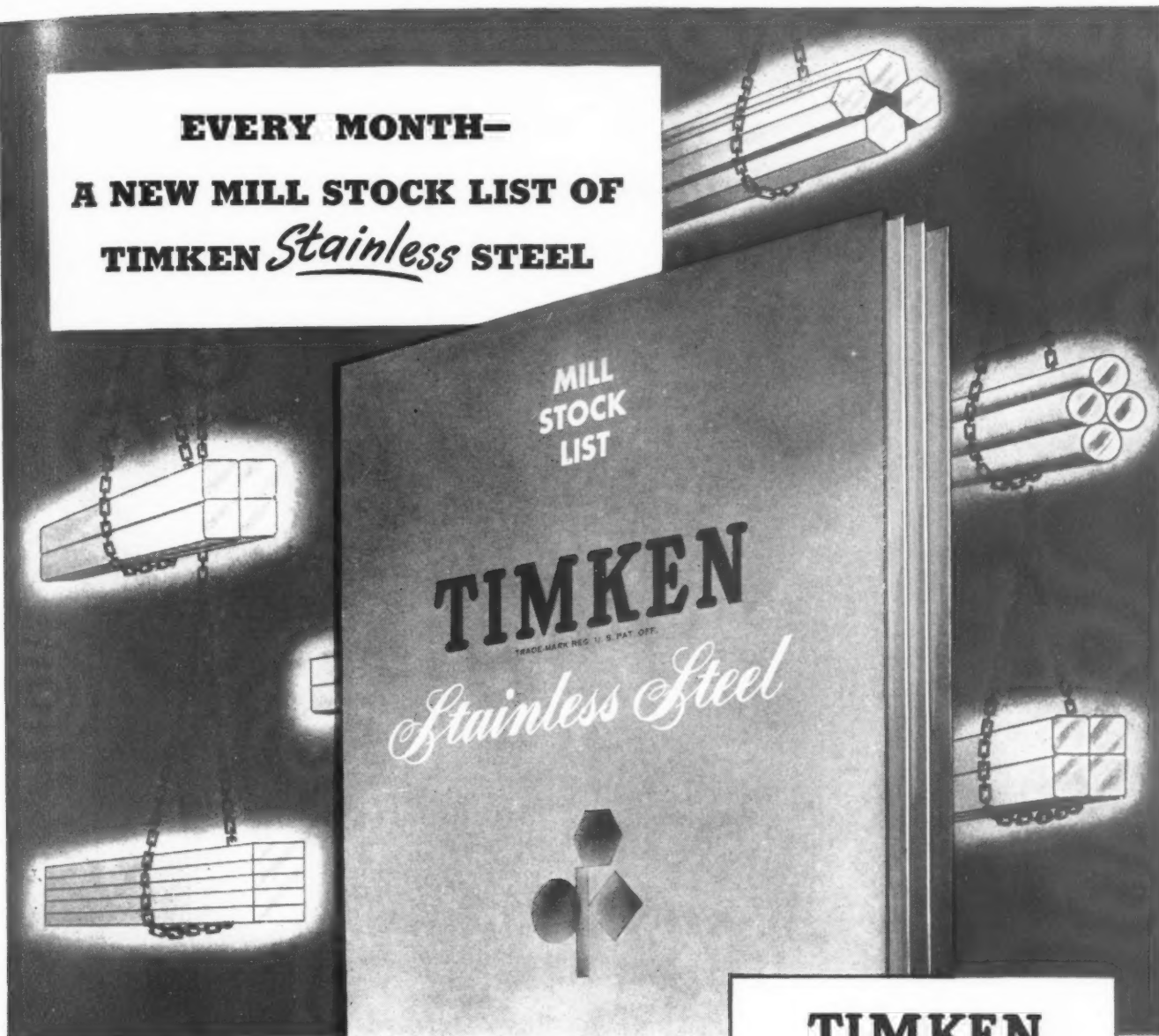
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

*On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation*

Bethlehem tool steels for every purpose



**EVERY MONTH—
A NEW MILL STOCK LIST OF
TIMKEN *Stainless* STEEL**



—is your name on our list?

To provide buyers with a complete up-to-date listing of the sizes, shapes, finishes and types of stainless steel bars in our mill stock for immediate shipment!

Our customers value this service highly, for often it saves valuable time in securing shipment of hurry up orders.

Whether you are a regular user of Timken Stainless Steel or not, we will be glad to send you this monthly listing. *Write, telling us where you want it sent.*

And when it arrives, remember that the Technical Staff behind it whipped the toughest problem ever laid in a steel producer's lap — development of the stainless steel "16-25-6" for the turbine wheel of the turbosupercharger and jet propulsion engine. Remember that the same Technical Staff is available to help you with any problem you may have in stainless steel.

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
Fine Alloy
STEEL AND
SEAMLESS TUBES

**STEEL AND TUBE DIVISION,
THE TIMKEN ROLLER BEARING
COMPANY, CANTON 6, OHIO**

SPECIALISTS in hot rolled and cold finished Alloy Steel Bars for forging and machining applications, as well as a complete range of Stainless, Graphitic and Standard Tool Steel analyses. Also Alloy and Stainless Steel Seamless Tubing for mechanical and pressure tube applications.

★ YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



TONS
of

Johnson **UNIVERSAL BRONZE BARS**

Catalogue

76 pages filled with
bronze bearing informa-
tion, fully illustrated.
Write for your free copy.

It is no longer necessary to put up with delay in securing bronze bars. Simply call your local Johnson Bronze Distributor. Tell him the *finished bearing size*. He will fill your needs at once . . . from stock!

Be sure to specify Johnson UNIVERSAL Bronze. There is no higher quality available. Every bar is completely machined . . . I D . . . O D . . . ENDS. This saves your time, eliminates all danger of hidden defects. Each bar is entirely usable from end-to-end.

Why not check your needs now? From our list of over 350 stock sizes you can buy exactly according to your requirements.

JOHNSON
SLEEVE BEARING
520 S. MILL STREET



BRONZE
HEADQUARTERS
NEW CASTLE, PA.

Here's help to speed your work with *Stainless Steel*

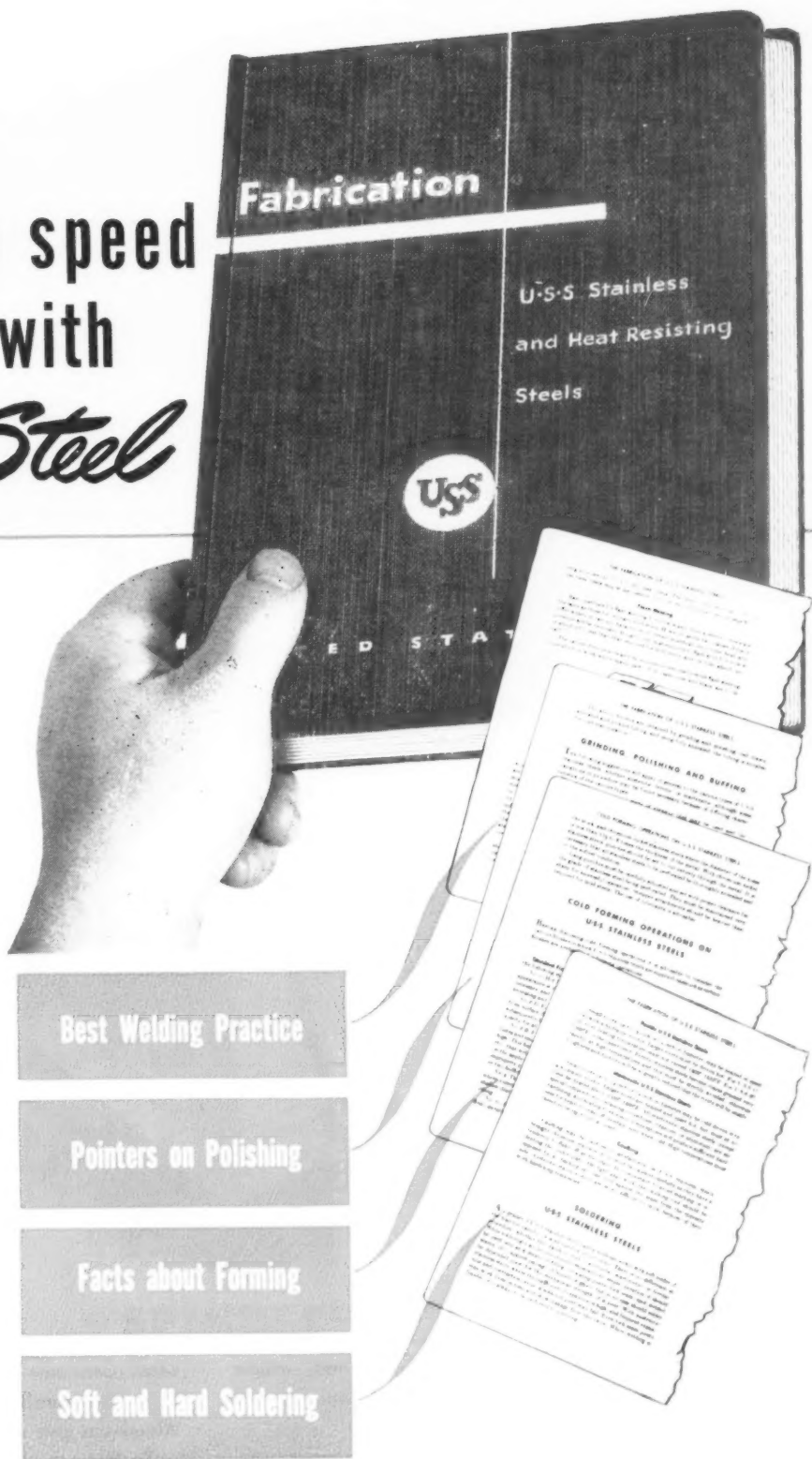
SUCCESSFUL fabrication with Stainless Steel needs exact methods. But these methods are difficult only when operations are inordinately severe or where an unusual alloy has had to be selected to withstand unusually severe conditions. In over 99% of the cases, Stainless Steel fabrication is *not* difficult . . . it is just *different*.

In this authoritative textbook, just off the press, these differences in fabricating techniques are thoroughly discussed.

Here in practical form are assembled the very latest findings on Stainless Steel welding, riveting, soldering and joint design—on machining, cutting, forming, annealing and pickling—on surface finishing and protection.

Here are listed for handy reference the various U·S·S Stainless Steels we produce—their physical properties and chemical compositions—the forms and sizes in which they are available—their resistance to various reagents.

This book is FREE—send for your copy. Use it as a guide to successful workmanship. And when unusual conditions confront you, ask for the assistance of our Stainless Steel specialists.



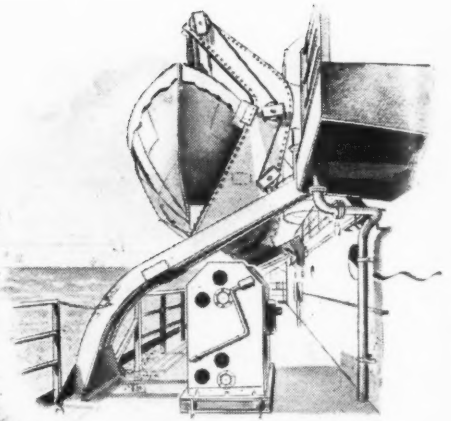
U·S·S STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, Cleveland, Chicago and New York
CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago
COLUMBIA STEEL COMPANY, San Francisco
NATIONAL TUBE COMPANY, Pittsburgh
TENNESSEE COAL, IRON & RAILROAD COMPANY, Birmingham
United States Steel Supply Company, Chicago, Warehouse Distributors
United States Steel Export Company, New York

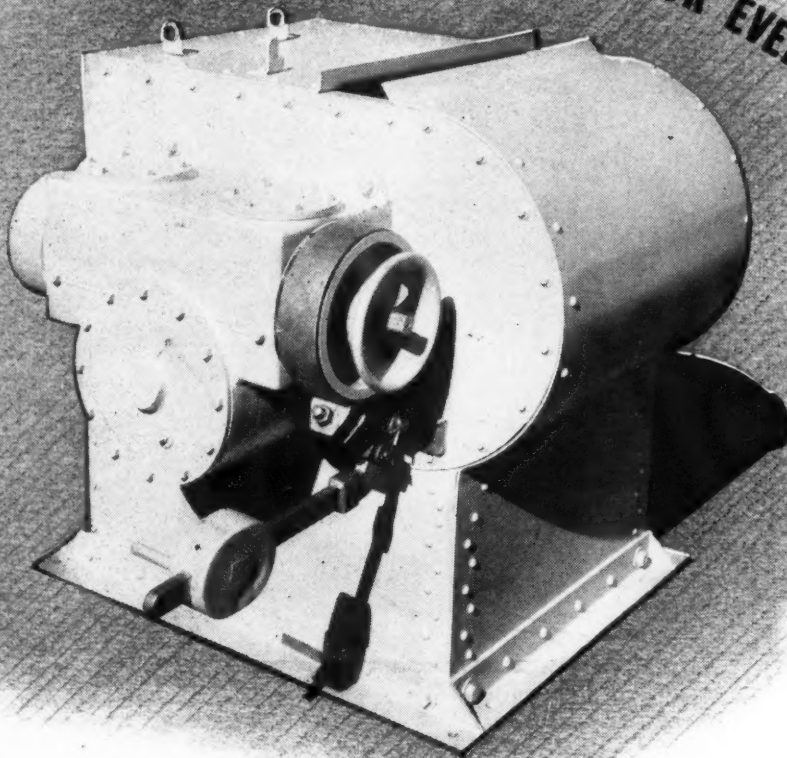
We can supply U·S·S Chromium Nickel and Chromium Stainless Steel not only in many different analyses but in the widest, most complete range of forms, sizes and surface finishes anywhere obtainable. Our engineers are specialists in solving new and unusual problems in the use of Stainless.

UNITED STATES STEEL

43% lighter!



SAVES OVER A TON OF DECK WEIGHT FOR EVERY LIFEBOAT STATION



Welin lifeboat winch, made lighter with Alcoa Aluminum, is designed with a minimum factor of safety of six. Approved by U.S. Coast Guard.

It weighs only 2,845 pounds, compared to 5,000 pounds for an old-style winch—this newest addition to Welin Davit & Boat's line of "all-aluminum" lifesaving equipment. That's a ton of deck weight eliminated for every lifeboat station. Compensating ballast can be less, payloads higher.

IN YOUR PRODUCTS. As in that marine equipment, Alcoa Aluminum will give your products added utility value. Perhaps the weight you save translates itself

into greater mobility, smoother and faster operation, lower costs.

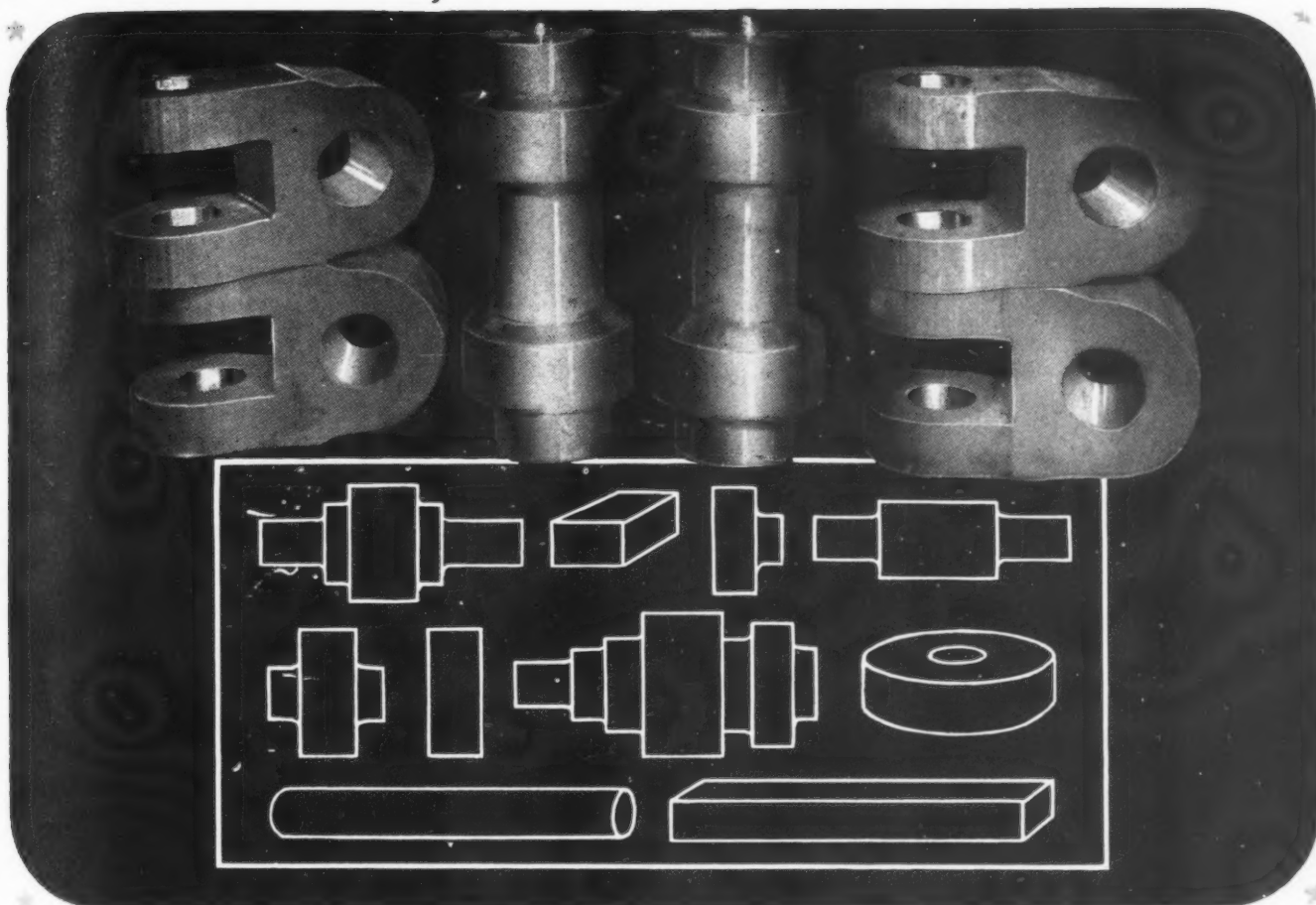
Aluminum's ability to resist corrosive attack, and its resulting longer life, often opens new markets for your products. The many attractive, durable surface finishes possible with Alcoa Aluminum give added sales appeal.

To find out what aluminum will do for you, get in touch with the nearby Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 1748 Gulf Bldg., Pittsburgh 19, Pa.

ALCOA FIRST IN ALUMINUM



IN EVERY COMMERCIAL FORM



STAINLESS STEEL FORGINGS

to your specifications

- **RINGS**
- **BARS**
- **HUBS**
- **DISCS**
- **SHAFTS**
- **SPECIAL SHAPES**
- **BLOCKS**
- **SPINDLES**



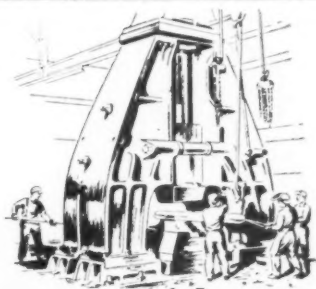
**ALLEGHENY
LUDLUM**

STEEL CORPORATION
Forging and Casting Division
Detroit 20, Michigan

ROUGH MACHINING HEAT TREATING

Any Allegheny Ludlum field representative will gladly give you further particulars, or write us direct.

Address Dept. M-48.

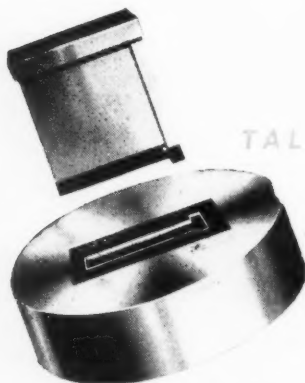
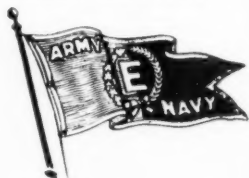


OVER
3,000,000
Impressions from
one **TALIDE DIE**

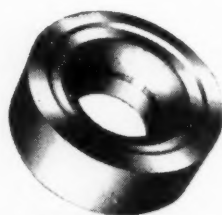


TALIDE DIE NIB
WEIGHING 100 LBS.

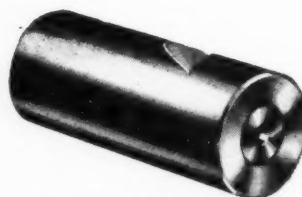
Here's a cold forming job on alloy steel forgings 4 1/4" dia. x 15 3/8" long which requires more pressure and generates greater friction than steel dies can take in one operation.



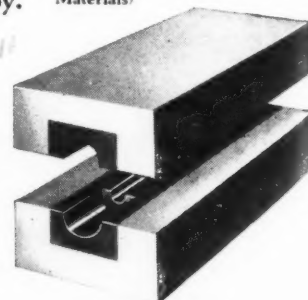
BLANKING AND FORMING DIE
(For Stamping Lamination Discs,
Metals, Plastics, Paper)



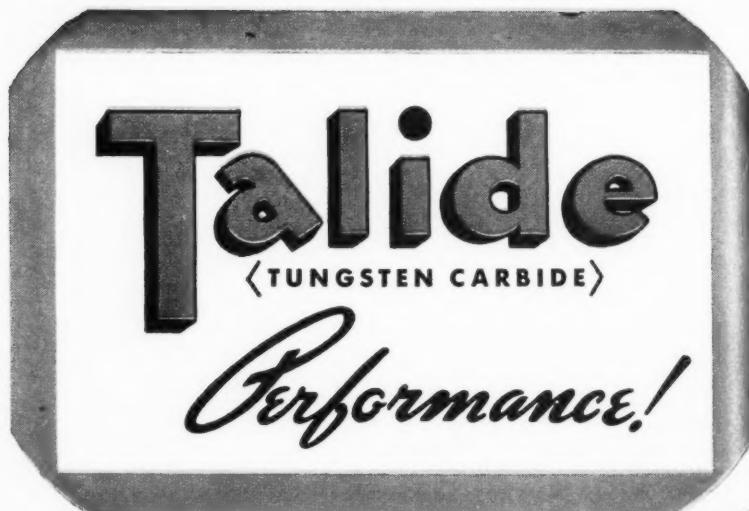
SHEET METAL DIES
(For Deep Drawing Metal
Products)



HEADING AND EXTRUSION DIES
(For Shaping and Sizing Bolts,
Nuts, Screws, and Rivets)



SWAGING DIES
(For Forming Solid and
Tubular Shapes)



By replacing steel with a Talide Tungsten Carbide Die, the projectiles were swaged in one operation. Two operations were needed with steel dies. After three million impressions, the smooth, highly finished, large Talide Die needed no redressing. And in each of the three million, the operators reported complete elimination of galling, scratching and pick-up.

Talide Dies can be used for any cold working operation where steel dies wear out too fast or on applications too severe for steel dies. Metal Carbides make Talide Dies in all sizes up to 24" diameter, I. D.

Complete information on TALIDE Tungsten Carbide Dies is given in Bulletin 43-WP... write for a copy.



TUBE MANDREL



DRAWING DIES
(For Wire,
Tubing and
Bar Stock)



POWDER
METALLURGY
DIES
(For
Compacting
Powdered
Metals and
Materials)

TALIDE METAL MEETS EVERY REQUIREMENT

THE ENGINEERED CARBIDE FOR ALL APPLICATIONS

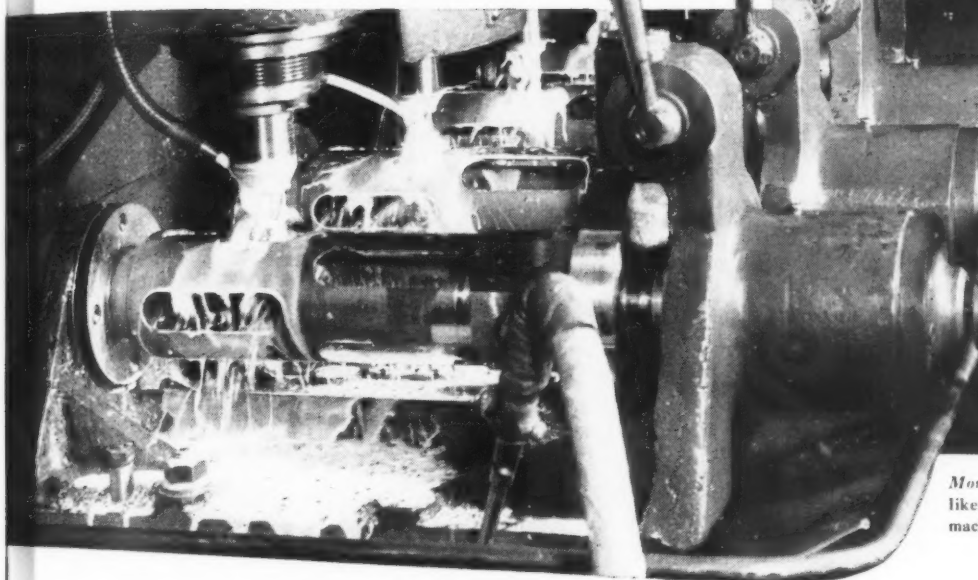


METAL CARBIDES CORPORATION

YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

SINTERED CARBIDES FOR CUTTING • HOT PRESSED CARBIDES FOR DRAWING AND WEAR RESISTANCE

One way to meet higher costs



More parts per day can be made on a multiple set-up like this using Shelby Seamless Tubing for its high machinability.

Use Seamless Tubing and get more production per man-hour

It takes ingenuity to figure out ways to combat rising costs, but you can profit from the experience of others.

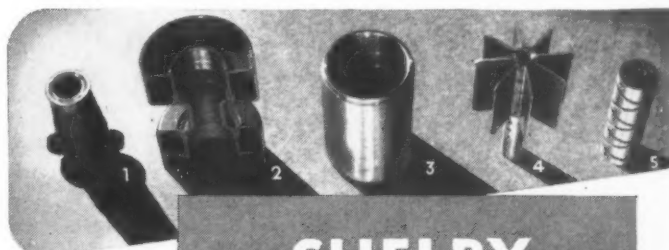
During the war, manufacturers learned that seamless steel tubing had advantages over solid forgings on scores of new type jobs. Production was increased many times by set-ups such as the one illustrated above.

With Shelby Seamless Tubing you start out with the basic shape already made. This eliminates at least a forging and certain machining operations. The better machinability of Shelby Tubing and its uniform high quality permit fast production. Parts can be turned out at considerably less cost than those made by slower methods.

You can obtain Shelby Seamless Tubing processed to suit your particular requirements. Our service engineers work with you and with our own

metallurgical department to develop the material most suitable for your machining operations.

Sizes of Shelby Seamless Tubing range from $\frac{3}{8}$ inch to $10\frac{1}{2}$ O.D. inches and in wall thickness from .035 inches to 1.500 inches cold drawn. Write for complete details and analyses available.



1. Connector for truck and trailer.
2. Roller for tractor.
3. Bearing shell.
4. Pump impeller.
5. Winder for textile machine.

**SHELBY
SEAMLESS**
Steel Tubing



NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Tubing Specialties Division

Columbia Steel Company, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

UNITED STATES STEEL

OAKITE

COOLANT NEWS

New Manual tells how Oakite Coolant improves CUTTING, MACHINING, GRINDING of ferrous and non-ferrous metals

AN unusual development that is making good as a coolant in hundreds of plants on a wide range of forming, drilling, tapping, grinding and other machining operations, Oakite Soluble Oil possesses remarkable cooling, lubricating and rancidity-resisting properties. Completely and readily dispersed in water, it forms uniform stable well-balanced emulsions that promote chatter-free, clean-cutting action, improved cooling, a better finish, greater production, longer tool life.

**OAKITE
SOLUBLE
OIL**

A high quality, specially compounded soluble oil which provides many advantages and economies as a coolant and lubricant in

CUTTING
MACHINING, GRINDING
AND RELATED OPERATIONS
ON FERROUS AND NON-FERROUS
METALS



Sold and Serviced by
OAKITE PRODUCTS, INC. NEW YORK 6, N. Y.

FREE Since paper shortage limits supply, we suggest you
SEND FOR YOUR COPY TODAY!

WHERE TO BENEFIT FROM OAKITE COOLANT

Turning, Boring
Cold Sawing
Drilling, Reaming
Crush Form Grinding

Machining
Threading, Tapping
Milling
Machining plastics

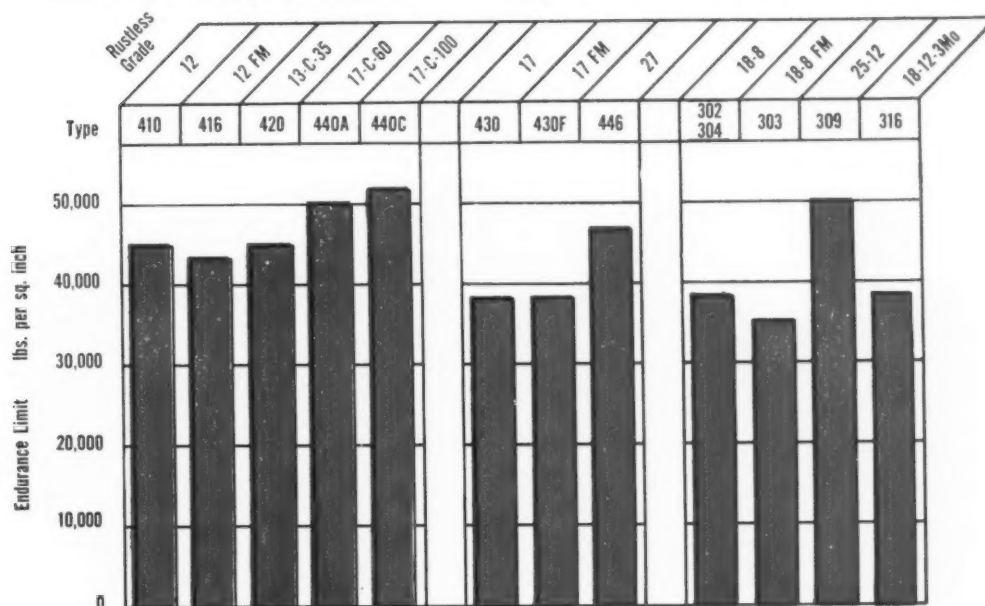
OAKITE PRODUCTS, INC., 24 Thames St., NEW YORK 6, N. Y.
Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE *Specialized* CLEANING

MATERIALS · METHODS · SERVICE · FOR EVERY CLEANING REQUIREMENT

Corrosion Resistance Plus Resistance to Fatigue

One of the Many Combinations of Properties Offered by Stainless Steels



METALS get tired. Under many repetitions of stresses metals become fatigued, and are not able to endure loads indicated as safe by the usual static tension and compression tests. When corrosive conditions are severe, this danger is exaggerated, causing a substantial drop in the safe loading stress. Stainless steels, however, show higher endurance limits or resistance to fatigue under many conditions, and will outperform other engineering materials under any number of repeated stress cycles.

Endurance limits have been established to indicate the safe loading stress which a material can withstand under an unlimited number of repeated stress cycles. Endurance limits are used in the design of moving machine parts such as pump shafting, aircraft controls, springs and instrument parts where loads are applied in repeated cycles—from maximum to zero, or from maximum tension to maximum compression. Endurance limits vary for different materials and for different conditions of that material. Endurance limits are closely related to tensile strength and usually approximate one-half the ultimate tensile strength. Therefore, any treatment which alters the tensile strength, also alters the endurance limit. Values of endurance limit indicated in the above chart represent stainless steels in the annealed condition and, therefore, are the minimum values to be expected. Hardening either by cold work or by heat treatment will raise the endurance limit to a considerable extent. Stainless steels not hardenable by heat treatment can be cold worked to obtain endurance limits approaching 100,000 pounds per square inch. Stainless grades hardenable by heat treatment go even higher. Types 420, 440A and 440C, when hardened and stress relieved, offer endurance limits well over 100,000 pounds per square inch—higher than many straight carbon steels, and much higher than any other standard engineering material.

There are many factors which affect fatigue and make it a complex subject. Scratches, machine marks, nicks, dents, and other surface irregularities form stress concentration points and promote the progressive failures which are characteristic of fatigue. Temperature has a pronounced effect on fatigue. Corrosion, in combination with fatigue, has extreme effects usually predictable only by studies of service performance. Fatigue is a subject requiring special attention. When you want to use stainless steel to resist corrosion fatigue, consult our specialists.

Automatic bottling equipment must withstand a severe combination of service conditions, and must be made of material of high fatigue strength—

For a complete report on why one prominent manufacturer uses stainless steels almost exclusively for this purpose, and how the hundreds of different parts are machined to rigid quality standards at high production rates—request a copy of Rustless' latest 3-page case history "Machining Stainless Steels by Preference."



SALES OFFICES:
ATLANTA • BALTIMORE • BERKELEY • BOSTON
BUFFALO • CHATTANOOGA • CHICAGO
CINCINNATI • CLEVELAND • COLUMBUS
DALLAS • DAYTON • DETROIT • HOUSTON
INDIANAPOLIS • KANSAS CITY • LOS ANGELES
MILWAUKEE • MINNEAPOLIS • NEW YORK
PHILADELPHIA • PITTSBURGH • RICHMOND
ST. LOUIS • SOUTH BEND
DISTRIBUTORS IN PRINCIPAL CITIES



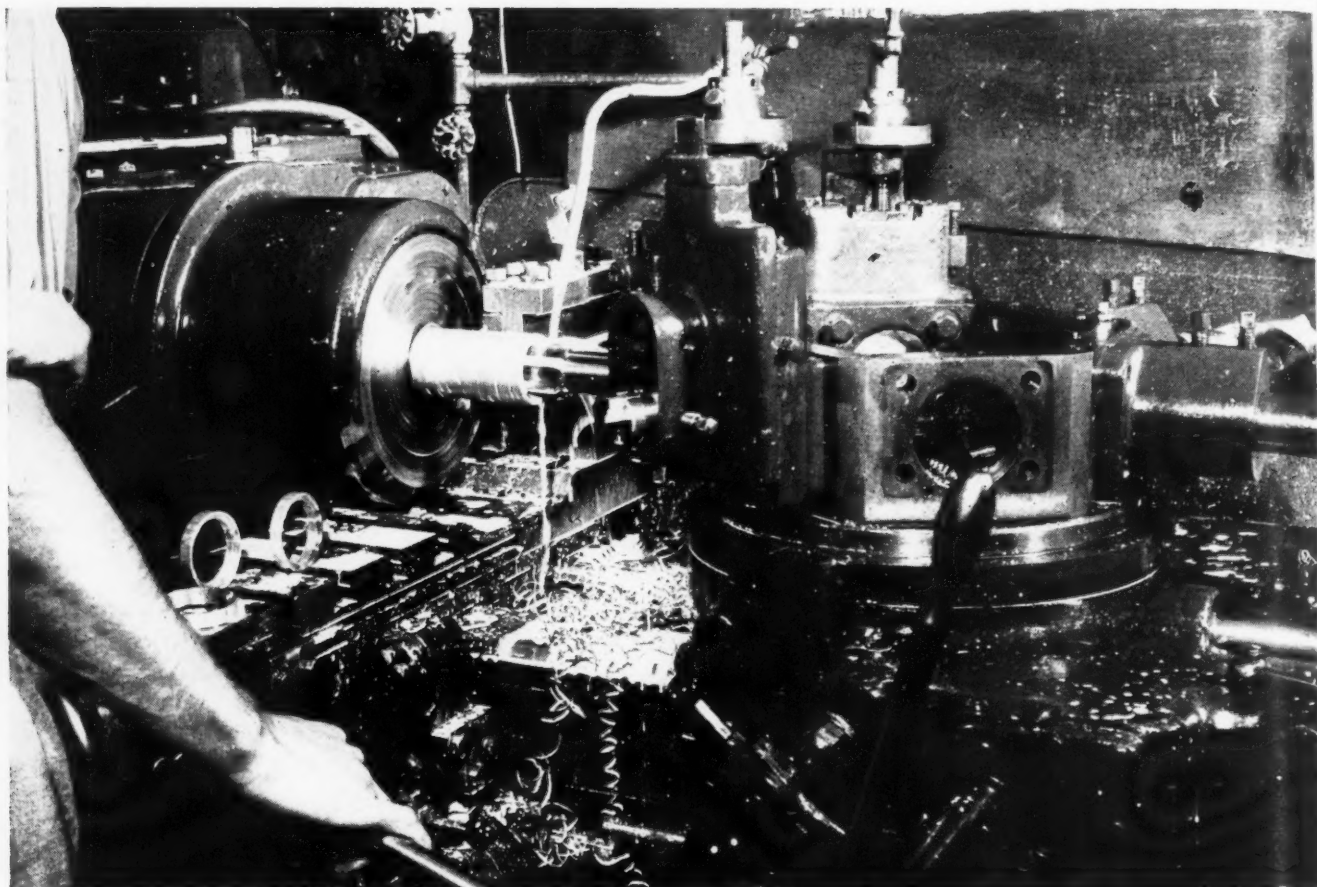
DIVISION OF

RUSTLESS IRON AND STEEL DIVISION
THE AMERICAN ROLLING MILL COMPANY
Baltimore 13, Maryland
STAINLESS STEEL SPECIALISTS

A COOLANT

That LUBRICATES the Tool

SINCLAIR UMBRA



MANY METAL working problems that seem difficult of solution may be the result of using an oil that functions *only as a coolant*.

In such cases the answer may be found in a coolant that also has lubricity combined with high anti-weld property. That's where Sinclair UMBRA comes in.

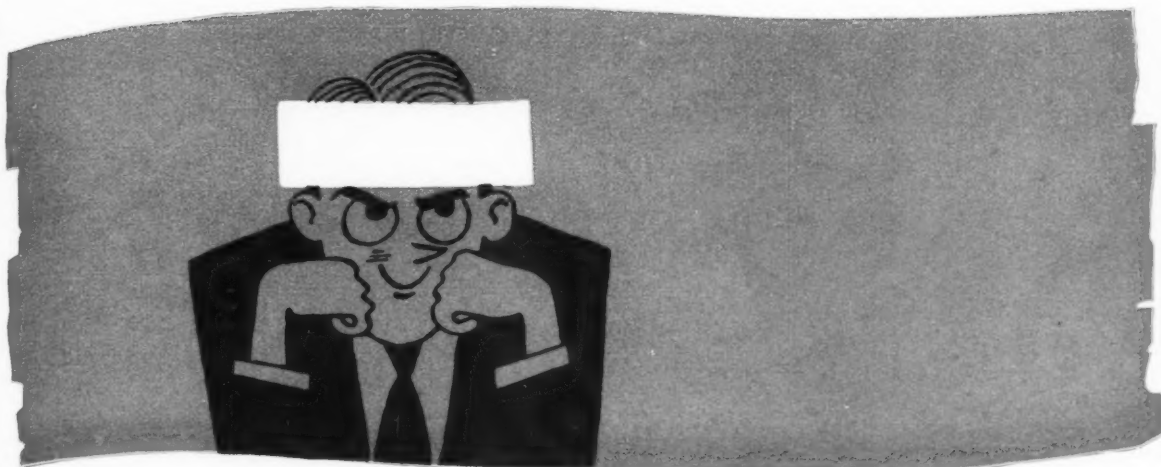
UMBRA is a cutting oil compounded to give it lubricating properties as well as unusual effectiveness as a heat dispersant.

UMBRA is just one of a complete line of Sinclair cutting oils and coolants — a line that provides specialized products for all types of machining.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Put your mind on a BLANK!



A plastics blank, of course . . . a blank punched from BAKELITE plastic molding board that *could* be the answer to one of your supply problems.

For many manufacturers, here is an idea that might go far toward easing the present stringency in supply of molded plastic parts. For certain uses . . . particularly for flat shapes . . . BAKELITE molding board provides a shock-resistant plastic in a more workable, convenient form. It is more readily available, and it may often be substituted in whole or in part, for other types of molding plastics. For general molding requirements the material is supplied in a special "diced" or cubed form that can be pre-formed on automatic tableting machines. Regardless of form in which supplied, these molding board plastics anchor metal inserts securely, give great impact strength to heavy duty parts and staunch reinforcement at vital points—and yet *they can be molded in general-purpose molds*. Isn't this worth discussing with your supplier?

BAKELITE phenolic resin molding boards, blanks, and diced material give high moisture resistance and excellent dimensional stability in addition to impact strength. The blanks are furnished in disk, rings, rectangles or squares in various thicknesses. A rich, glossy black is the final color.

BAKELITE's engineers will be more than glad to consult with you and your suppliers and help you determine new ways to improve your production and extend your supplies of plastics. Write Department 41 for full information.

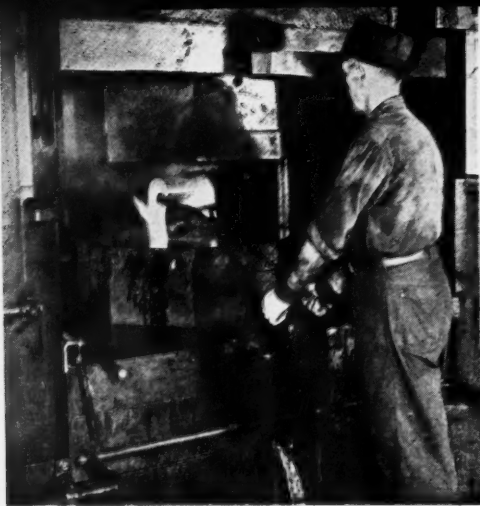
BAKELITE CORPORATION, Unit of Union Carbide and Carbon Corporation  30 East 42nd St., New York 17, N. Y.



TRADE-MARKS

BAKELITE

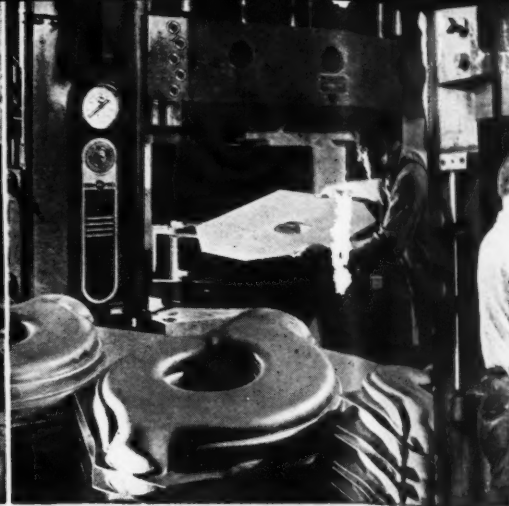
MOLDING BOARDS and BLANKS



FORGING H-P-M presses for flat and closed die forging are revolutionizing the forging industry.



FORMING H-P-M presses are ideally suited for forming heavy metal parts.



DRAWING H-P-M presses are the production standard for deep sheet metal drawing.

THE H-P-M *All-Hydraulic* PRESS ...Industry's Most Versatile Production Machine For **PRESSURE PROCESSING**

Most products, regardless of their nature, require the application of pressure in their manufacture. In these industries, H-P-M self-contained hydraulic presses are revolutionizing production technique. Deeper draws, less rejects, fewer operations, better grain structure, more even density, faster production and less maintenance are natural results of applying modern H-P-M hydraulics to pressure processing problems. All of these worthwhile features result in lowering manufacturing costs.

For 69 years, The Hydraulic Press Mfg. Company's activities have been devoted exclusively to the production of hydraulic presses. This specialized effort has

resulted in the most versatile line of all-hydraulic press equipment ever offered for pressure processing. H-P-M is the only builder of completely integrated presses, with press frame, pumps, valves and controls all built by a single organization. Investigate H-P-M presses for your pressure processing work. H-P-M engineers will be glad to discuss your production problems. Write today, stating your requirements.

THE HYDRAULIC PRESS MFG. COMPANY
Mount Gilead, Ohio, U.S.A.

Branch Offices in New York, Philadelphia, Cleveland, Cincinnati, Detroit and Chicago. Representatives in other principal cities.

DIE CASTING H-P-M high pressure metal die casting machines are of revolutionary all-hydraulic design.

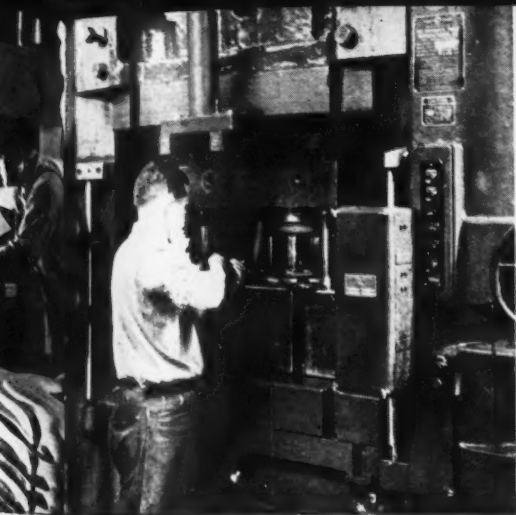


BENDING H-P-M presses are built for diversified bending of large diameter tubing, structural steel, etc.



PLASTICS MOLDING H-P-M builds a complete line of plastics molding presses - injection, compression, etc.





esses are
deep sheet

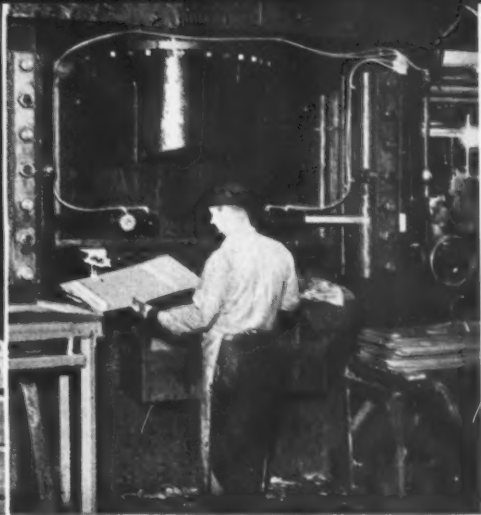
COINING

H-P-M presses are used extensively for coining and sizing metal parts.



STRAIGHTENING

H-P-M presses are universally accepted for die straightening malleable castings.



EMBOSSING

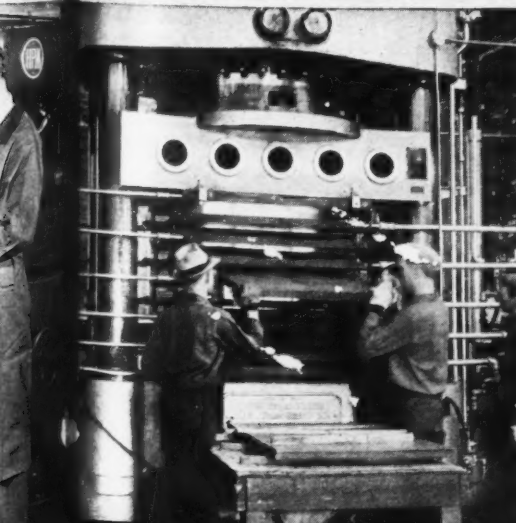
H-P-M presses provide the answer to mass production metal embossing problems.



BRIQUETTING H-P-M presses briquette many materials — salt, carbon, ceramics, metal powder, etc.

Write today on your company letterhead for your free copy of H-P-M's new 84 page bulletin describing "All-Hydraulic" presses for pressure processing . . . an informative textbook concerning modern hydraulic press applications for mass production.

LAMINATING H-P-M presses laminate many types of plastic impregnated materials.

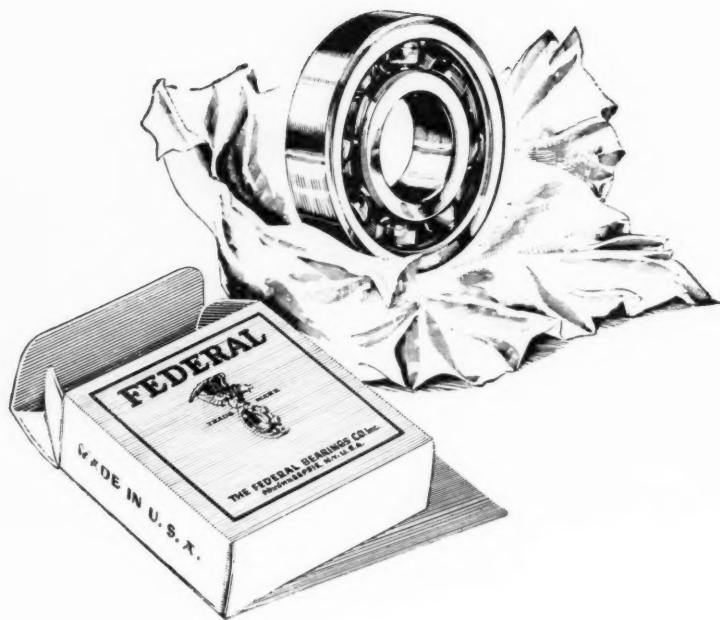


STEERING H-P-M presses are employed by leading producers of viscose rayon and cellophane.



EXTRUDING H-P-M extruding presses are used principally to coat welding electrodes.





SMOOTH RUNNING  IS IN THE PACKAGE, TOO!

There's a world of difference between *still-fit* and *operating fit* in a ball bearing, especially when you're blue-printing higher R.P.M.'s into your product design. Holding run-out to a minimum is the problem in order to maintain proper running clearances. Here's a true measure of ball bearing precision...in manufacture and operation both.

At Federal, inner and outer races of *every* ball bearing are ground concentric with each other to prevent run-out. The bore is cylindrical, not tapered or bellmouthed, and the sides of the rings are held parallel to each other and the ball track. No Federal Bearing is either too tight or too loose.

Add to this, the ball track ground to a chatter-free finish and just the right radius, plus balls uniformly

spherical within .000025" and not varying in diameter more than .00005" in any bearing, and you have the precision ingredients for close tolerance performance.

Over 100 individual production, cleaning and inspection operations go into every Federal Bearing, and *every fourth operator is an inspector*...all good reasons why, *whenever tolerances are tight*, specify Federal Bearings for smooth running...in any range or size.

THE FEDERAL BEARINGS CO., INC. • POUGHKEEPSIE, NEW YORK

Makers of Fine Ball Bearings

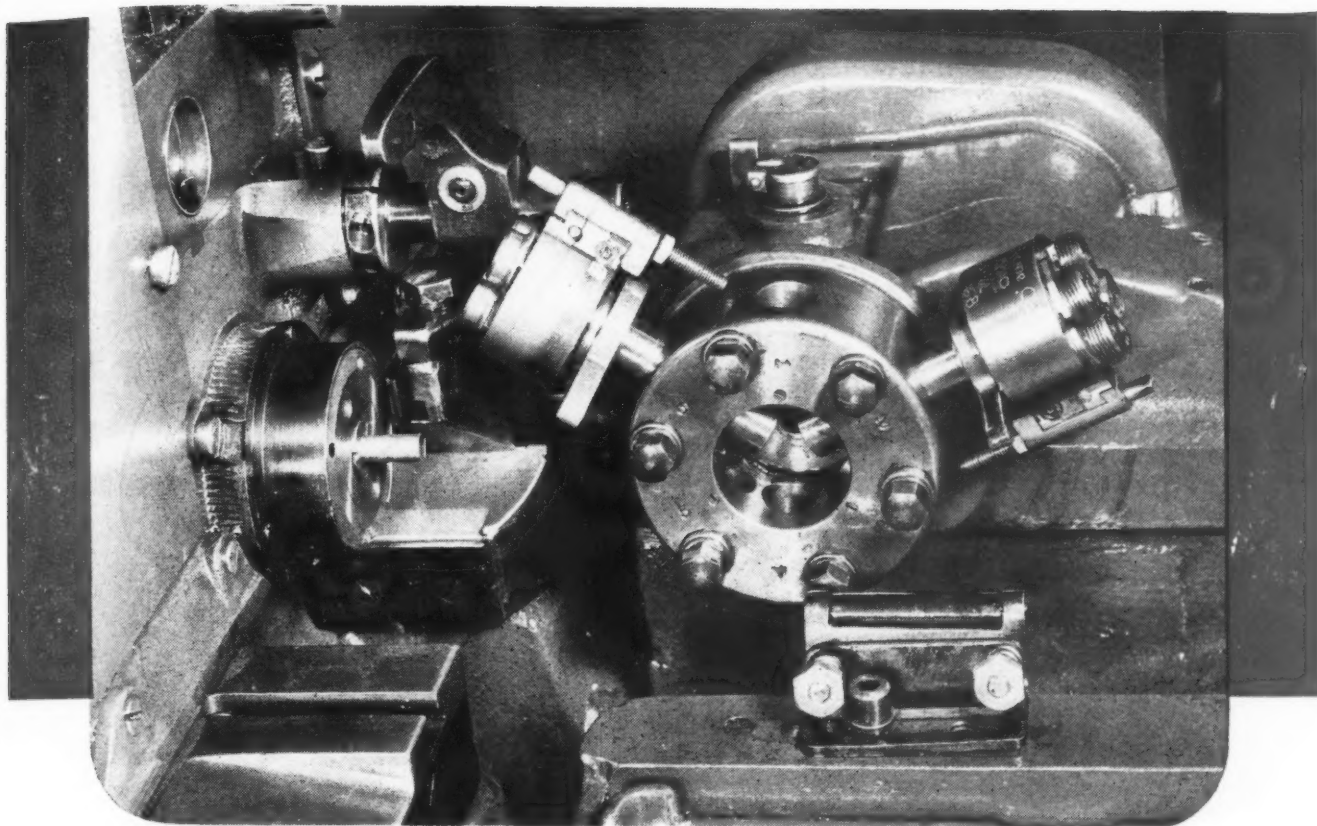
REPRESENTATIVES LOCATED AT

Detroit: 2640 Book Tower—26 • Cleveland: 402 Swetland Building—15
Chicago: 8 S. Michigan Ave.—3 • Los Angeles: 5410 Wilshire Blvd.—36



FEDERAL BALL BEARINGS

ONE OF AMERICA'S LEADING BALL BEARING MANUFACTURERS



NEW POSITIVE-ACTING VERS-O-TOOL DIE HEAD

For Brown and Sharpe Automatics

Here's a die head that doesn't miss. Positive cam action closes the head and *keeps* it closed during the non-cutting part of the cycle. And the famous Namco Vers-O-Tool action insures automatic opening when the exact length of the cut has been reached.

Literature and prices on request.

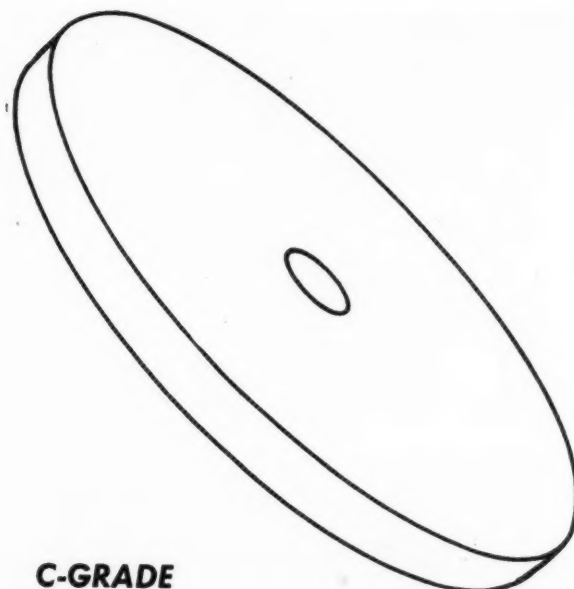
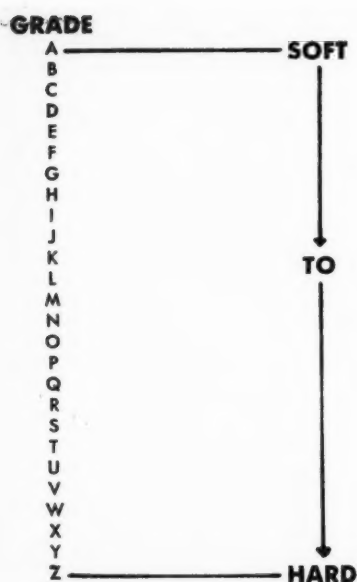
EXCLUSIVE VERS-O-TOOL FEATURES

- Interchangeable circular milling cutters and ground thread chasers
- Multiple cutting through four circular cutters
- Close limits of tolerance and concentricity
- Quick diametric adjustment
- Micrometer control for regrinding
- Hardened and ground parts for long life and accuracy

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics:
1-4-6 and 8 Spindle • Hydraulic Thread
Rolling Machines • Automatic Threading Dies
and Taps • The Chronolog-Limit, Motor Starter
and Control Station Switches • Solenoids
Centrifuges • Contract Manufacturing



There's more to grinding g



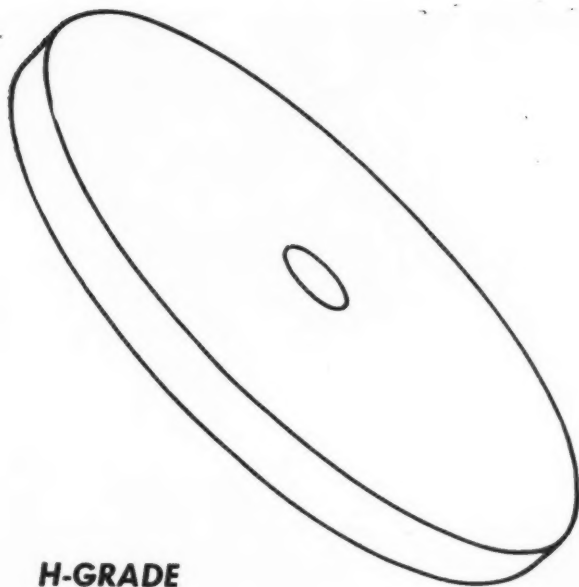
The A, B, C's which appear as identification on a grinding wheel help simplify proper grade selection. By clearly showing relative hardness, they make your choice quicker, easier...aid in assuring the right grade for the job. That's one reason wheels by CARBORUNDUM are plainly marked. But, there's more to it than the old chestnut, "the softer the metal, the harder the wheel." It's not that easy.

The same grade reacts differently at various wheel speeds. The condition of the machine and the amount of vibration can make a difference. Desired finish...required tolerance must be considered. Coolant conditions vary. The actual type of operation—snagging, surfacing, internal grinding whatever it is—influences practical selection.

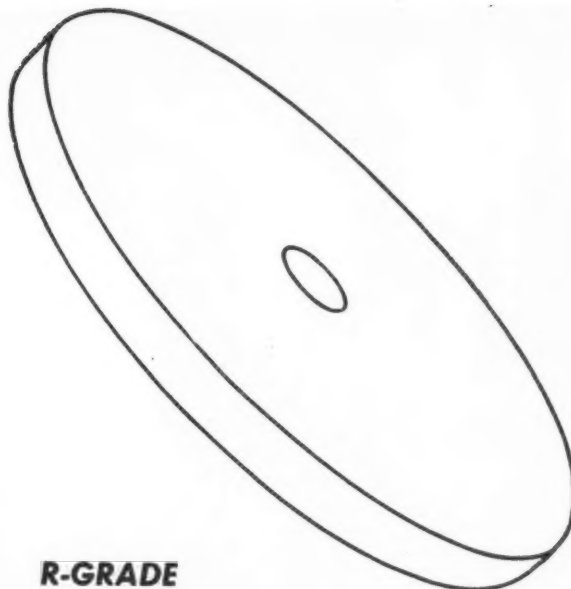
Yes—there are many important factors to check before you can be sure of the right grade designation for the job.

A good rule for good grinding... **CALL**





H-GRADE



R-GRADE

grades than the A, B, C's

That's why we suggest consulting your CARBORUNDUM salesman or our distributor's representative. These men work throughout the year on a wide variety of grinding problems. They are familiar with grinding in production...in tool rooms...

...wherever it is used. They have practical knowledge and experience to help you pick exactly the wheel you need for the job.

Assisting these representatives in the field are our Abrasive Engineers. Specialized ex-

perts, they are equipped to analyze uncommon problems...recommend sound solutions. And, here in our modern laboratories are scientists and technicians who are working on the application of abrasive developments to changing grinding practices.

This *three way* service is easy to use. Just plan to talk "grinding" soon with your CARBORUNDUM representative. He'll be glad to assist you. The Carborundum Company, Niagara Falls, New York.

IN CARBORUNDUM

TRADE MARK

ABRASIVE WHEELS

Silicon Carbide
Aluminum Oxide
Diamond

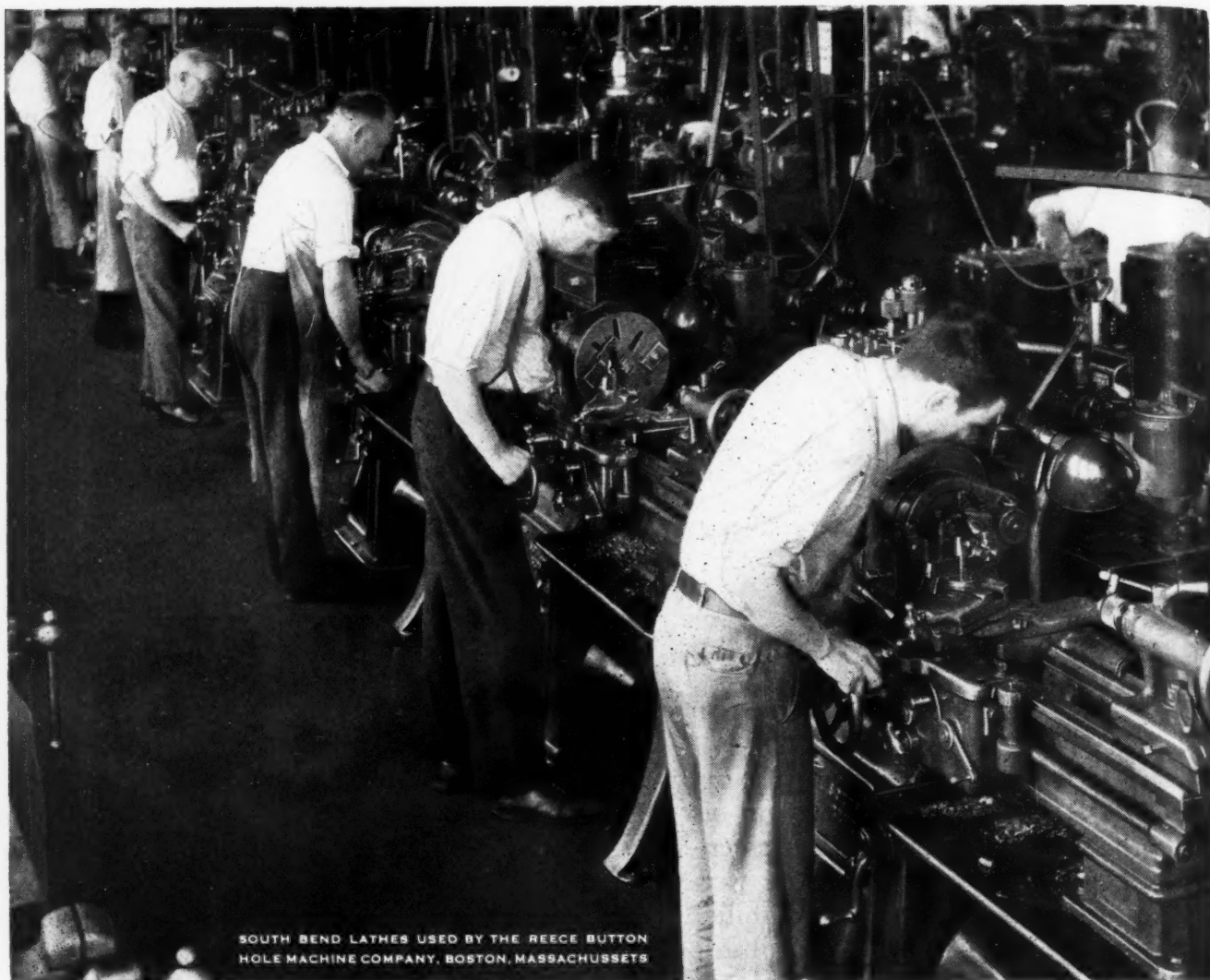
COATED AND BONDED ABRASIVES

Paper and Cloth
Combination
Sheets, Rolls, Discs
Cylinder Hones
Sticks, Stones & Rubs
Specialties

ABRASIVE GRAINS AND COMPOUNDS

for:
Polishing
Lapping
Pressure Blasting
Finishing

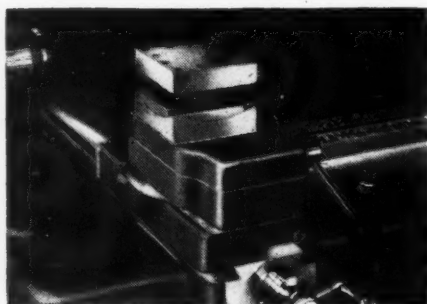
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company



SOUTH BEND LATHES USED BY THE REECE BUTTON
HOLE MACHINE COMPANY, BOSTON, MASSACHUSETTS

SOUTH BEND LATHES

Speed the Flow of Production



BROADEN SCOPE OF LATHES

A complete line of South Bend attachments and accessories further increases the versatility and productiveness of South Bend Lathes. Write for illustrated Accessory Catalog 77.

Time saved in machining operations helps speed the flow of production, reduces manufacturing costs, and increases profits. A few seconds cut from each operation are highly important. Machine tools that are easy to operate, that can handle a wide variety of operations, consistently produce work to specified tolerances and finish, and stay "on the job" day after day with a minimum of maintenance, are profit-producing installations. Because South Bend Precision Lathes offer these, and other outstanding advantages, they are the choice of leading industries and shops everywhere. A South Bend Lathe distributor near you will be glad to help you select the lathes and equipment best suited to your requirements. Write today for his name and a copy of Catalog 100-D which illustrates in full color and completely describes the entire line of South Bend Precision Lathes and Attachments.

LATHE BUILDERS SINCE 1906

SOUTH BEND LATHE WORKS

424 EAST MADISON STREET • • • SOUTH BEND 22, INDIANA



Y

ours

*At No Extra Cost
when you specify*

THREADWELL TAPS

"i-dot-ified"—for easy, instant identification of the type of tap
—*red* dot for cut thread, *white* dot for commercial ground, *blue*
dot for precision ground.

"tap-capsuled"—in individual metal-capped, transparent
plastic tubes that provide perfect protection for clean, ground
threads and make it easy to select the right tap before unwrap-
ping and handling.

with polished flutes—that provide extra protection against
chip clogging and reduce danger of breakage.

"greaseless rust-proofed"—by a special Threadwell process
which keeps them clean, dry and shining—never messy or sticky.

"cold-tempered"—at 120° below zero to give them the hard-
ness without brittleness to produce better threads and more of
them in steels, cast iron, alloys, plastics and other abrasive
materials.

*Threadwell Taps are sold exclusively through Mill Supply Distributors. Ask for
them at the Threadwell distributor's in your locality. You might as well enjoy
these Tap extras since they cost nothing extra.*

DISTRIBUTORS IN LEADING
INDUSTRIAL CENTERS
THROUGHOUT THE UNITED STATES
AND THE WORLD

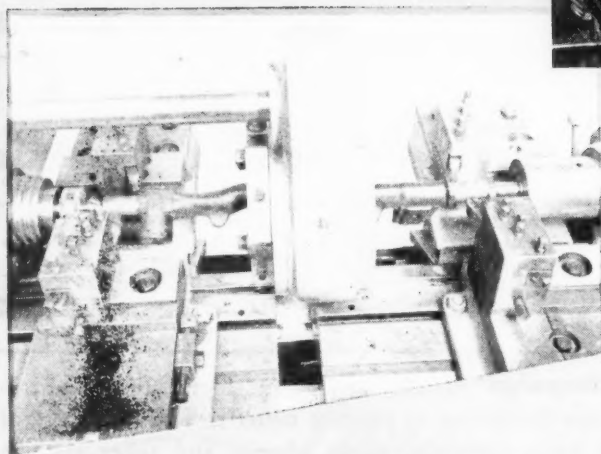
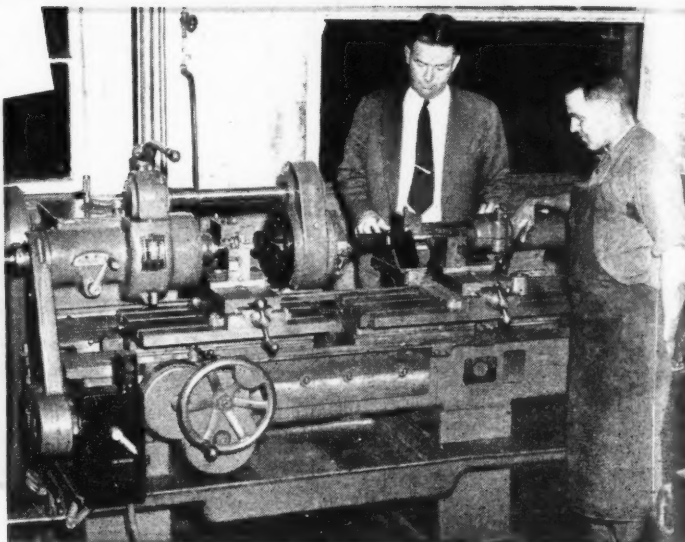
THREADWELL

TAP AND DIE COMPANY • GREENFIELD, MASSACHUSETTS, U. S. A.

CALIFORNIA OFFICE, THREADWELL TAP & DIE CO. OF CALIF., 1322 SANTA FE AVE., LOS ANGELES 21

Threadwell
SINCE 1902
"TAPS OF DISTINCTION"

BOSTON



Closeup of the center drive and special front and rear tool blocks installed on a LeBlond Special Purpose Lathe for the pick shaft job.

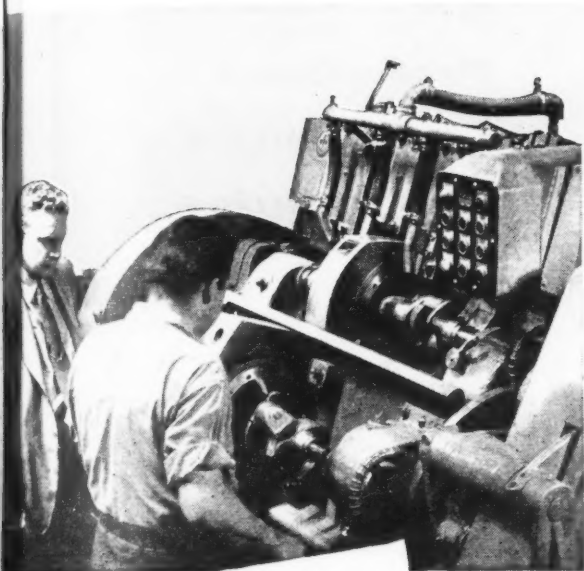
ALBERT M. STEDFAST,
Stedfast & Roulston, Inc.,
Boston, Mass.

"Since the days of our well-remembered 'tea party', Bostonians have seen to it that they get what they need, whether it's tea or machine tools. We shoulder the responsibility for equipping manufacturing plants all over the world and our mechanical men, long trained in the New England tradition of quality and precision, select tools with a critical eye. Machinery you ship into the 'Hub' has to be right for the job.

"Take this big textile machinery manufacturer I visited the other day. They handle a tricky job of turning and facing pick shafts. On their LeBlond Special Purpose Lathe, equipped with center drive, both ends of these shafts are turned, faced, and filleted, simultaneously. This lathe is giving them dimensional uniformity at a cost that has these people well satisfied. It's an all-around nice piece of special tool work."

These LeBlond Agents and many others... one of them near you... know metal turning as few men know it. Since they offer the largest line of lathes available from one manufacturer, their unbiased advice on the selection of a lathe for any specific use can be relied upon.

Industry's Story in...



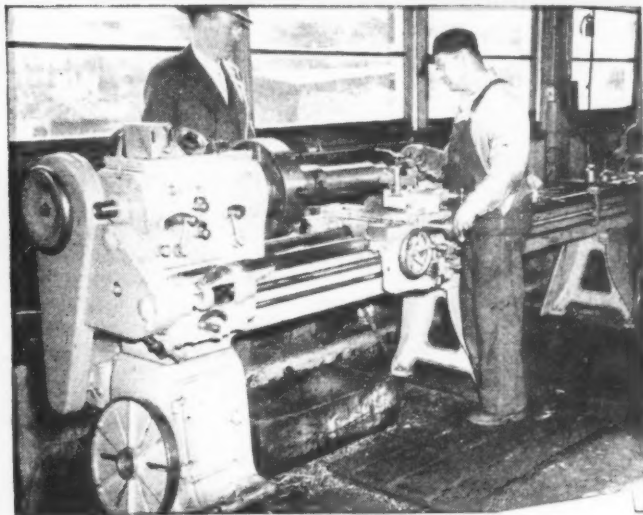
BUFFALO

R. L. CRANE,
R. L. Crane Machinery Co.,
Buffalo, N. Y.

Flying, rolling, or sailing, Buffalo is a transportation town. It's surprising how many of the things we make are designed to go somewhere, carry something somewhere, or just keep on the move. Naturally, a lot of automobiles list Buffalo as their home port. And, naturally, Buffalo auto builders see to it that their plants operate machine tools that keep cars rolling down the line. Here's proof of that...this picture of one of several LeBlond DM Automatic Crankshaft Lathes now operating in a big Buffalo car plant. They've found that LeBlonds keep the pace up and trouble down."

"What does economy mean to a gold miner? Plenty! Here's a story with something of the romance of the old Alaska days, plus plenty of good common sense fact of today. Years ago, up in Fairbanks, Alaska, they designed quite a drill for test boring gold-bearing earth. This machine was so successful at that, and a lot of other uses, that the company now making them, the Fairbanks Drill Co., here in Seattle, is plenty busy. They needed a lathe with a long bed for turning pipe and drill stems and, for several years, tried to find a good used one. However, as soon as we told them about Regals, they realized that they could have a brand new Regal for very little more than the cost of a lot of used machines. Result...this 19" x 18' 0" Regal moved in and Fairbanks is fixed for low cost precision turning for a long time to come."

L. J. KINNANE,
Kinnane Machinery Co.,
Seattle, Wash.



SEATTLE

The R. K. **LeBlond**

MACHINE TOOL COMPANY
CINCINNATI 8, OHIO

NEW YORK 6, Singer Bldg., 149 Broadway, COntland 7-6621-2-3

CHICAGO 6, 20 N. Wacker Drive, STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

"Put it on the Blanchard"

Here is another example of how the BLANCHARD increases the production of these sprocket shaft supports over the former method.

These steel forged sprocket shaft supports are ground on a No. 18 Blanchard Surface Grinder equipped with a 36" chuck. Four pieces are placed on the chuck at one time and $\frac{1}{8}$ " to $\frac{3}{16}$ " of metal is removed from each surface.

They are ground at the rate of 10 per hour, whereas only $2\frac{1}{2}$ pieces were produced per hour by the former method of production.

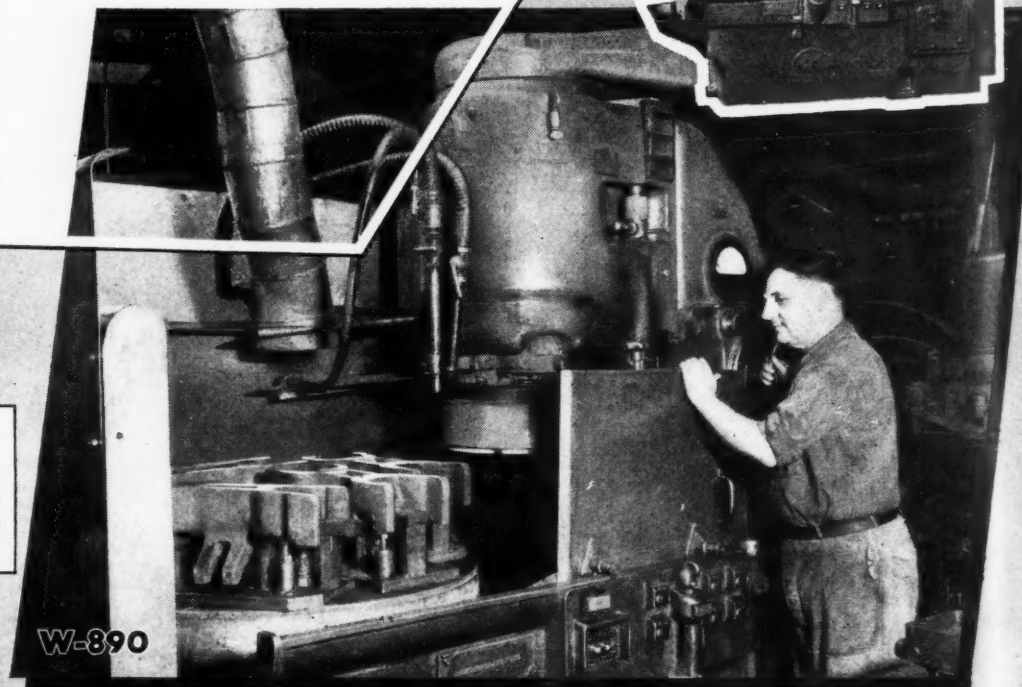
When surfaces must be flat and parallel, "put it on the Blanchard" and increase production.

GET THESE ADVANTAGES

- Production** ✓
- Adaptability** ✓
- Fixture Saving**
- Operation Saving**
- Material Saving**
- Close Limits**
- Fine Finish**
- Flatness** ✓

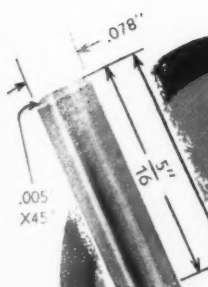


Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.



The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.



3 OPERATIONS IN 72 SECONDS ON A **GORTON** (SWISS-TYPE) AUTOMATIC

1. TAPER
2. CHAMFER
3. CUT-OFF

Approximately
3 TIMES SIZE

Selector Needles Completed at Rate of 400 Per Day; Tolerances Both Diameters and Lengths Held to $\pm .001''$

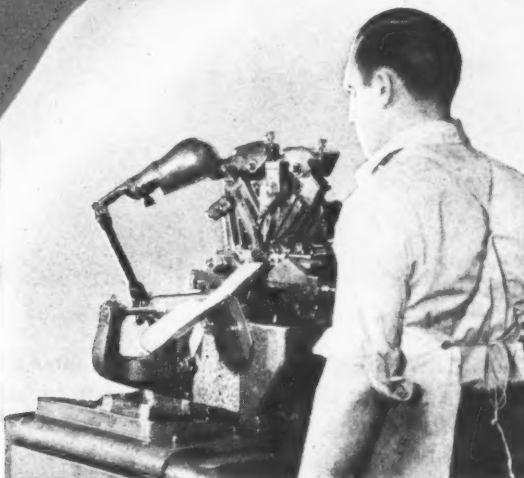
The turning of these selector needles is but one of the many jobs this manufacturer runs on a Gorton Automatic. Specifications call for three operations—turn taper, chamfer and cut-off. Overall part length is $2\frac{9}{32}''$. Diameter of part is $.078''$; diameter of small end of taper is $.031''$. Needles are completed at the rate of one every 72 seconds. All tolerances are held to within $\pm .001''$.

Extremely Versatile Machine

The versatility of the Gorton Automatic is responsible for its wide-spread acceptance among manufacturers of many types of industrial equipment. The machine is designed to perform straight turning, shoulder turning, drilling, reaming, tapping, threading, slotting, counterboring, back recessing, curve generating operations in a single cycle. On free machining materials, the Gorton Automatic will turn diameters from $.005''$ to $\frac{7}{16}''$ in lengths of $\frac{1}{32}''$ to $3''$ and up to $6''$ with a double chucking device. It is especially recommended for turning long, slender parts having multiple diameters.

How to Pre-determine Results in Advance

Let Gorton Engineering Service show you how an Automatic can be used to improve your production. Mail detailed prints of some part now running or ready to be run on a lathe or conventional type screw machine. Our engineers will furnish you with production estimates and complete tooling information on how it can be done better on a Gorton. This service is offered without cost or obligation.



Courtesy—The Barber-Colman Company



JOB FACTS!

STOCK USED: $.079''$ drill rod.

OPERATIONS:

- Operation 1. Turn taper (.2868" per foot) $1\frac{13}{32}''$ long.
- Operation 2. Chamfer the large end $.005'' \times 45^\circ$.
- Operation 3. Cut-off.

PRODUCTION: 400 needles per 8 hour day.

TOLERANCES: Diameter $\pm .001''$; length $\pm .001''$.

REMARKS: Previously necessary to hand turn on small bench lathe and finish grind taper. Part was difficult to hold and machine because of size. All this was remedied and production increased by tooling the job on a Gorton Automatic.

YOURS FOR THE ASKING!

Here's information you can use—sixteen pages of valuable screw machine data, including detailed facts and figures on the Gorton Automatic, examples of how it operates and how it will aid in improving your production. Send for your free copy of Bulletin No. 1800 today.



GEORGE GORTON MACHINE CO.

1312 RACINE STREET, RACINE, WISCONSIN, U.S.A.

A NEW FILTER... A NEW PRINCIPLE

*to cut cartridge
replacement costs
in half*

Cuno's MICRO-KLEAN . . . a micronic-type filter made of molded fibre . . . uses Graded Density in Depth to collect more solids before needing replacement.

Here's a micronic filter that eats more dirt without choking.

Experience shows that the Cuno MICRO-KLEAN cartridge maintains efficiency twice as long as other micronic-type cartridges.

That's because the fibre concentration, travelling radially inward from the pressure-side surface to the discharge-side surface, is progressively greater — the spaces between fibres become smaller and more numerous.

MAXIMUM EFFICIENCY— NO CHANNELING

The MICRO-KLEAN filter cartridge is resinous-impregnated molded fibre. Fibres of micronic diameter and graded length are oriented for uniform distribution and formed into a cylindrical cartridge, under conditions permitting a controlled variation of density radially to a pre-determined optimum standard. Thus, as the fluid flows through progressively smaller and more numerous interstices, the foreign particles penetrate to varying depths according to their size. This means that the cartridge can accommodate more solids without affecting flow — and will have a longer efficiency life before needing replacement.

This method of controlling structure gives the same range of density over the entire element. The natural arrangement of the fibre mixture is not disturbed laterally, so the fibres remain criss-crossed in all directions and porosity is uniform concentrically at any depth. This — and the fact that the fibre structure is preserved by resinous impregnation and polymerization — means maximum efficiency for every unit of filter area — and a sure protection against channeling.

Cartridges now available will remove all particles larger than 25 microns and the greatest proportion of particles down to 1 micron. (Coarser and finer filtration will be available soon). Use coupon to write for information in more detail.



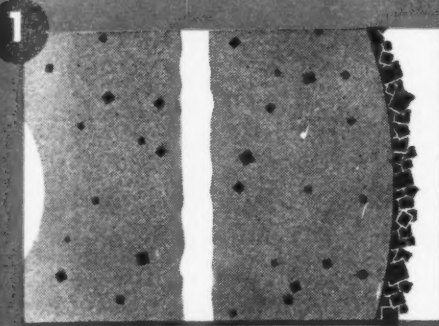
Cuno MICRO-KLEAN filters are available in a wide range of housing designs and replacement cartridges can be supplied in practically any desired length. Loosening a single nut disassembles housing for easy cartridge replacement on model illustrated.

WHAT MAKES MICRO-KLEAN LAST LONGER?

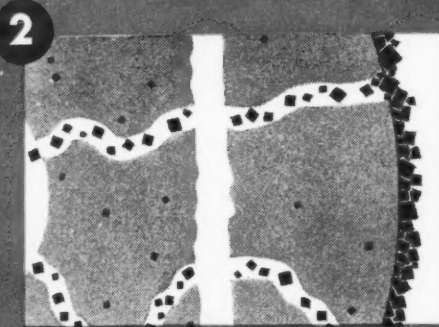
A special method of "felting" and impregnating micronic fibres, developed by Cuno engineers using the resources of a nationally known research foundation, has produced a depth-type micronic cartridge with *exclusive* advantages:

1. Graded Density in Depth, controlled concentrically and radially. Spaces between fibres become progressively smaller and more numerous approaching discharge surface. Smaller particles penetrate to varying depths — no sealing-over of inlet surface.
2. Resinous impregnated — each micronic fibre bonded in position — absolute protection against channeling, rupturing, shrinking or distortion.

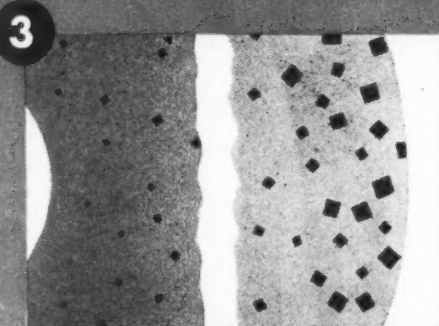
How MICRO-KLEAN Compares with Other Depth-Type Filters



1
SURFACE LOADING: Minimum openings are same on pressure side and discharge side; therefore, dirt accumulation is largely on pressure side.



2
CHANNELING: Uncontrolled distribution of filter media in the element permits fluid to find channels, passing solids larger than specified.



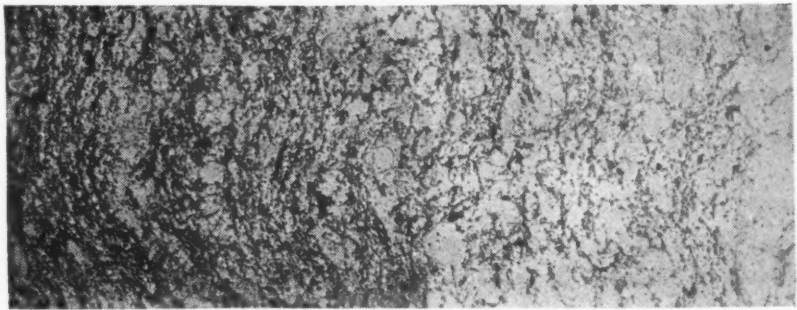
3
MICRO-KLEAN: Filter medium increases in density in direction of flow, from openings larger than rating to minimum openings on discharge-surface — more solids of all sizes collected within the element before stopping flow. Control of fibre distribution and bonding of fibres in correct position provide permanent channel-free structure.



Fluid Conditioning

REMOVES MORE SIZES OF SOLIDS
FROM MORE TYPES OF FLUIDS

GRADED DENSITY IN DEPTH



Photomicrograph shows progressively greater fibre density encountered by fluid as it passes from pressure surface (right) through depth of element to discharge surface (left).

MICRO-KLEAN greatly extends the range of applications for Cuno Fluid-Conditioning

With MICRO-KLEAN, Cuno — whose filters are used more by Industry than any other brand — offers you the equipment and engineering service to help you handle successfully almost any fluid-cleaning requirement.

Cuno's famous all-metal continuously-cleanable AUTO-KLEAN removes all particles down to .0035" from practically any fluids other than those containing highly abrasive solids. Cuno's wire-wound self-cleaning FLO-KLEAN is recommended for fluids containing large proportions of highly abrasive solids — mill river water, etc. Cuno's specially-designed COOLANT-KLEAN is for coolants used in precision grinding. Cuno's air filters remove unwanted solids, entrained moisture and oil from compressed air.

And now Cuno's MICRO-KLEAN extends the range of Cuno Fluid Conditioning down to micronic particles!

Cuno maintains a competent staff of engineers in twenty key cities across the country, who will cooperate with you personally and bring to you the active participation of Cuno's factory engineering staff. Sample fluid tests are conducted, either in our laboratory or in the field, upon arrangement.

Meanwhile, have us send you more information on Cuno MICRO-KLEAN. For convenience, use the coupon, listing the types of service in which you are interested.

MICRO-KLEAN HOUSING DESIGNS

Complete range from 3/8" to 4" inlet and outlet connections, handling up to 300 gpm. Other sizes available soon.

MICRO-KLEAN CARTRIDGE SIZES

1" I. D. and 2 3/4" O. D. standard at present. Standard lengths: 4", 8", 10". Special lengths available for built-in installations or for housings already in service.

CUNO ENGINEERING CORPORATION

1317 South Vine Street, Meriden, Conn.

Please send me information on Micro-Klean Filter relative to the services checked.

- | | |
|---|--|
| <input type="checkbox"/> Lubricating Oil | <input type="checkbox"/> Water and Water Solutions |
| <input type="checkbox"/> Hydraulic Oil | <input type="checkbox"/> Compressed Air |
| <input type="checkbox"/> Fuel Oil, Diesel | <input type="checkbox"/> Acids |
| <input type="checkbox"/> Fuel Oil, burner (Domestic and industrial) | |

Send information on MICRO-KLEAN to handle the following: (Write any other fluid-cleaning problem here.)

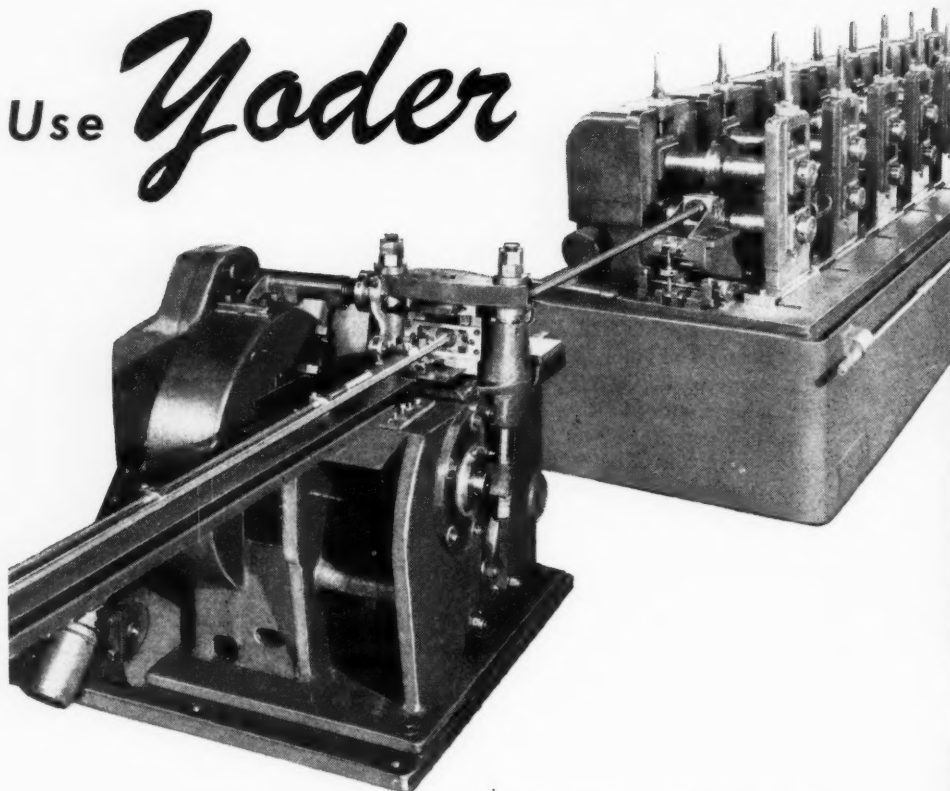
NAME

COMPANY

ADDRESS

For
HIGH SPEED CUT-OFF
Of Strip... Bar
or Formed Sections...
like these

Use *Yoder*



FLYING CUT-OFFS

Accurate cutting-off of intricate sections at high speed without deformation. Precise dies, rigid construction and accurate timing with the out-put speed of forming equipment with which they can be teamed give Yoder Cut-Off Machines high productivity in net tonnage per production year. Many types to choose from, including large or small rotary pipe and tube cut-offs or saw-type machines.

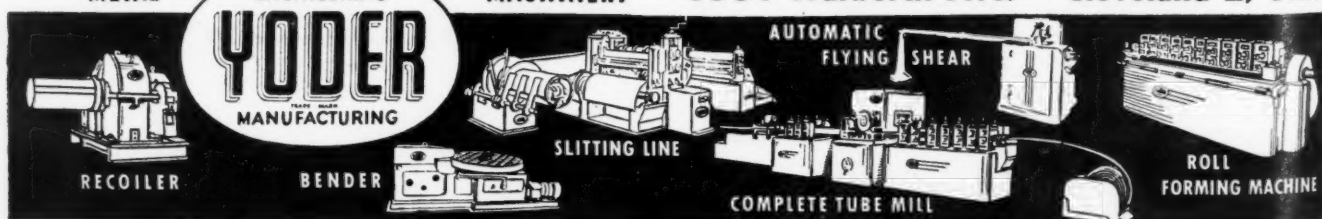
Yoder makes many other varieties of special high production metal working machinery... fully described in Bulletin G-451.

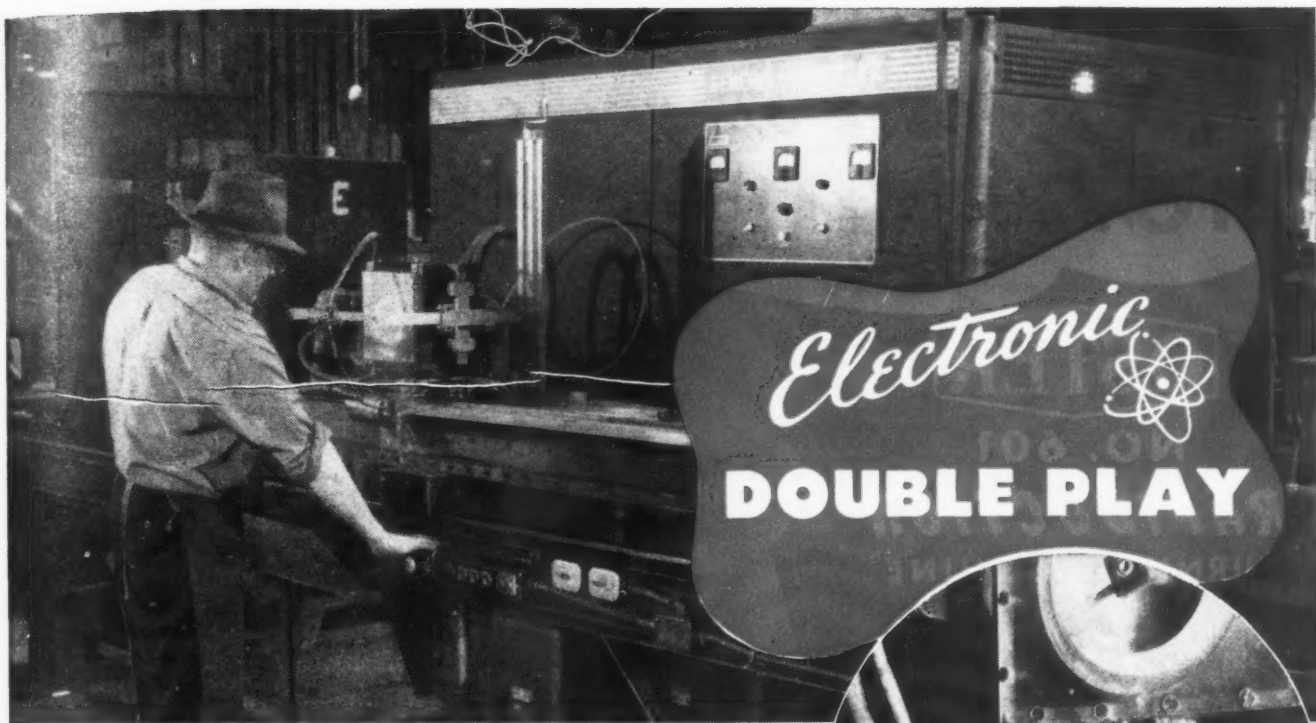
METAL • WORKING • PRODUCTION • MACHINERY

ENGINEERING
YODER
 MANUFACTURING

THE YODER COMPANY

5504 Walworth Ave. • Cleveland 2, Ohio



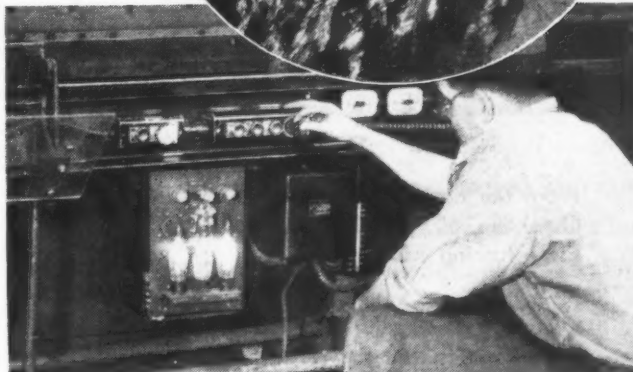
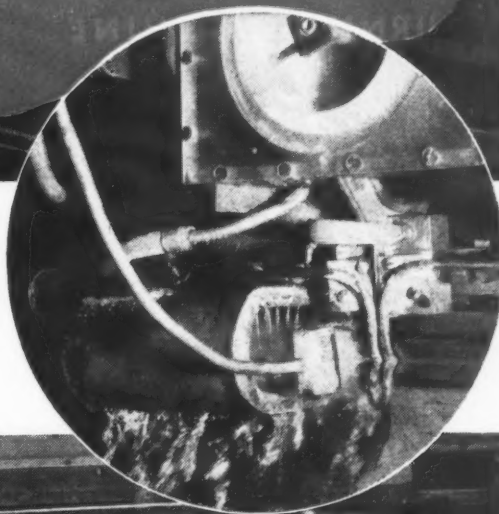


G-E ELECTRONIC HEATER and THY-MO-TROL DRIVE SOLVE DIFFICULT DIE-HARDENING PROBLEM

How could the wearing surfaces of brake dies measuring up to 20 feet in length be efficiently hardened? Because of the distortion difficulties due to the length of the dies, furnace hardening and salt-bath hardening were out of the question.—This was the problem referred to G-E engineers by the Dreis & Krump Manufacturing Company in Chicago.

After carefully analyzing the production requirements of this company, G-E heating specialists scored an electronic double play. The dies to be hardened are passed under the work coil of a G-E electronic heater by a G-E Thy-mo-trol-controlled carriage. Since the Thy-mo-trol drive equipment is connected into the plate circuit of the electronic heater, the speed of the carriage varies directly with the power output of the electronic heater. Thus, with this controlled carriage-speed and power-output ratio, the brake dies are hardened uniformly, with close depth control, and with minimum distortion. Also, Dreis & Krump are now producing a better product at a cost considerably lower than that of any other previous method of die hardening.

Perhaps your heat-treating operations could be similarly improved in speed, quality, and economy with G-E equipment and expert heat engineering. We shall be glad to furnish you with detailed information on G-E electronic heaters and to make specific recommendations for their application to your individual requirements. Just fill out and mail the coupon.



Brake-die wearing surface (above), passing under G-E electronic heater's work coil and into quench shoe for hardening.

Detail of electronic Thy-mo-trol equipment (below), for regulating carriage speed with heater's power output.

Apparatus Dept., Sec. J675-145

General Electric Company, Schenectady 3, N. Y.

My heat-treating problem is _____

Please have a G-E heating specialist get in touch with me.

Please send me the following free bulletins:

GEA-4284A "G-E 5-Kw Electronic Heater"

GEA-4637 "G-E 20-Kw Electronic Heater"

GEA-4348 "G-E 50-Kw Electronic Heater"

Name _____

Company _____

Address _____

City _____

State _____

8744

GENERAL  ELECTRIC

*From here on, you can adapt
it to your Exact needs*

OSTER

NO. 601

**"RAPIDUCTION"
TURNING MACHINE**

*Gives wide
Latitude
for Specific
Applications*



From the floor up to the ways and the spindle, the Oster No. 601 "RAPIDUCTION" is a basic, SIMPLIFIED turning machine.

From here on, you can get exactly what you want to adapt the machine to *YOUR specific needs*. The advantage is that the larger part of the machine is *STANDARD* with the resultant economy of a standard chassis; the equipment may be *either* special or standard with automatically indexed 6-position turret or a plain saddle with single tool post. Lever feed

or screw feed cross slides can be furnished also.

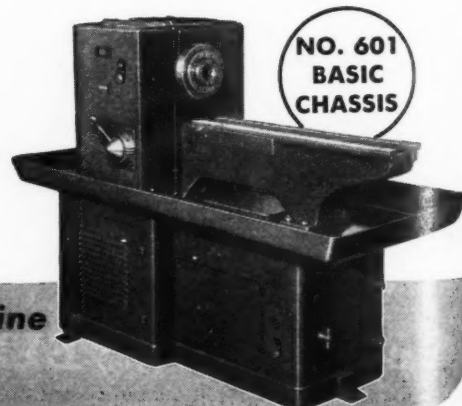
Any way you look at this "basic machine proposition" it spells *ECONOMY* and *EFFICIENCY* in capital letters. Optional *Worm Drive* or *Direct Drive* and optional 4-speed or 2-speed motor in the basic machine give you still wider selectivity. If *seriously* interested, write . . .

THE OSTER MANUFACTURING CO.
2073 East 61st Street • Cleveland 3, Ohio, U.S.A.

OSTER

"Rapiduction"

**The STANDARD Turning Machine
with CUSTOM-BUILT Features!**



7.6 secs.

... for 12 varied SECOND OPERATIONS

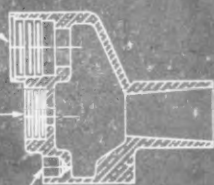
A BRONZE REGULATING VALVE

REQUIRING 12 VARIED SECOND OPERATIONS

$\frac{23}{32}$ CORE DRILL
STEP C'BORE & FACE
 $\frac{7}{8}$ -27 TAP - $\frac{7}{8}$ DEEP

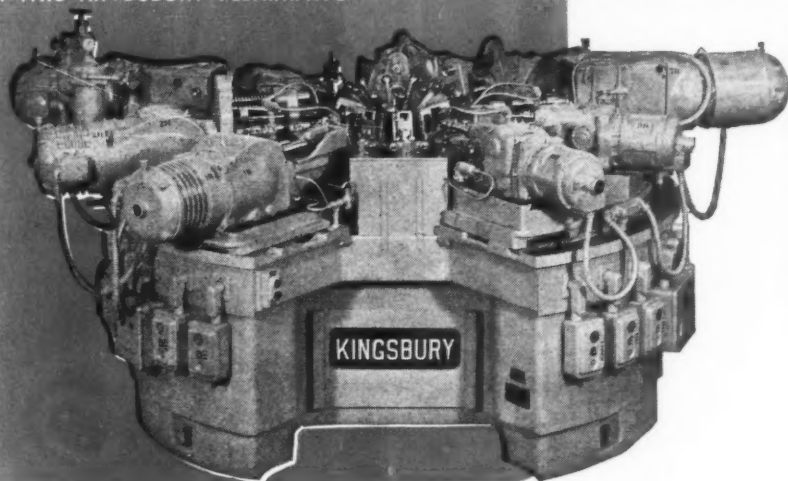
$\frac{1}{4}$ DRILL THROUGH
ROUGH C'BORE & FACE
FINISH C'BORE .710-.713
 $\frac{3}{4}$ -27 TAP - $\frac{1}{4}$ DEEP

.272 DRILL & $\frac{5}{16}$ X 45° C'SINK
 $\frac{5}{16}$ -24 TAP - $\frac{1}{4}$ DEEP



IS COMPLETED IN 7.6 SECONDS

ON THIS KINGSBURY FLEXIMATIC *



Twelve machining operations, including drilling, tapping, facing, counterboring, and countersinking, are completed on the illustrated bronze regulating valve in 7.6 seconds. The Kingsbury Fleximatic that does this complex, high production job is made up of 9 standard Kingsbury metal-cutting units mounted on a standard Kingsbury base. The Fleximatic is run by a single operator. He merely loads and unloads the special work holders of the automatically indexing turrets as they appear at his station. The machining operations are performed successively and automatically as the turret indexes.

The Fleximatic method is based on the use of standard units and modern engineering skill. Kingsbury experts study the production problem, then assemble the units in the most practical manner to produce at the most efficient rate. Such combined machining operations result in greater production and lower unit costs. And, the first cost is much lower than the usual special-purpose machine.

Do you have a production problem involving multiple machining operations? Send drawings and production data. Let our engineers suggest a profitable solution.

WE PUT OUR HEADS TOGETHER TO CUT YOUR DRILLING COSTS



KINGSBURY
MACHINE TOOL CORP.
KEENE, NEW HAMPSHIRE

WRITE FOR BULLETIN E.

* KINGSBURY FLEXIMATIC

— a special purpose machine for combined automatic operations during a single chucking
— the result of Kingsbury engineering ability in the use of low cost standard Kingsbury drilling and tapping heads on standard Kingsbury bases.

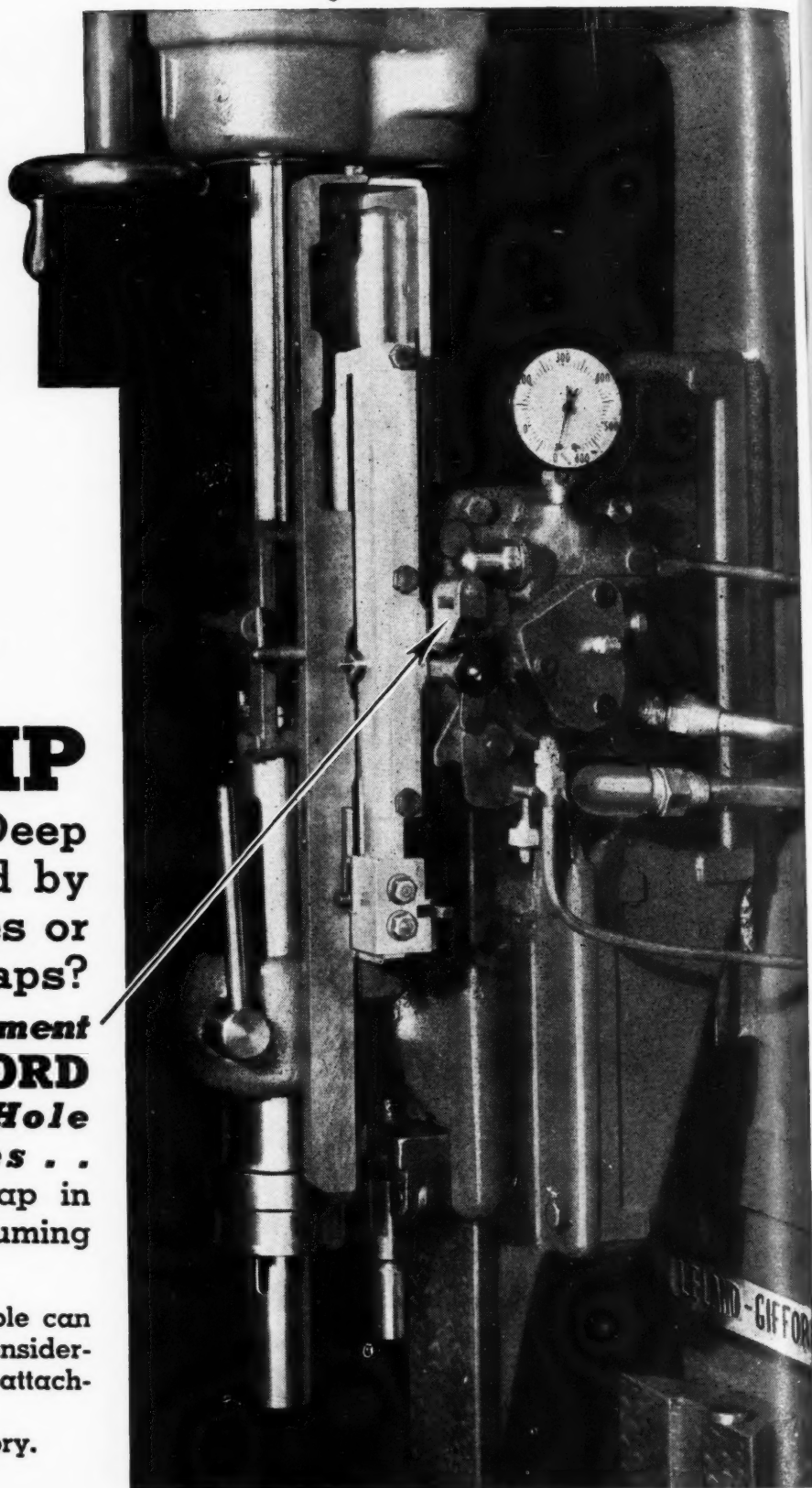


GAP JUMP

Are some of your Deep Holes interrupted by Large Cross Holes or other types of gaps?

The *Jump Gap Attachment* on **LELAND-GIFFORD Hydraulic Deep Hole Drilling Machines** . . . permits crossing this gap in Rapid Traverse, then resuming normal feed rates.

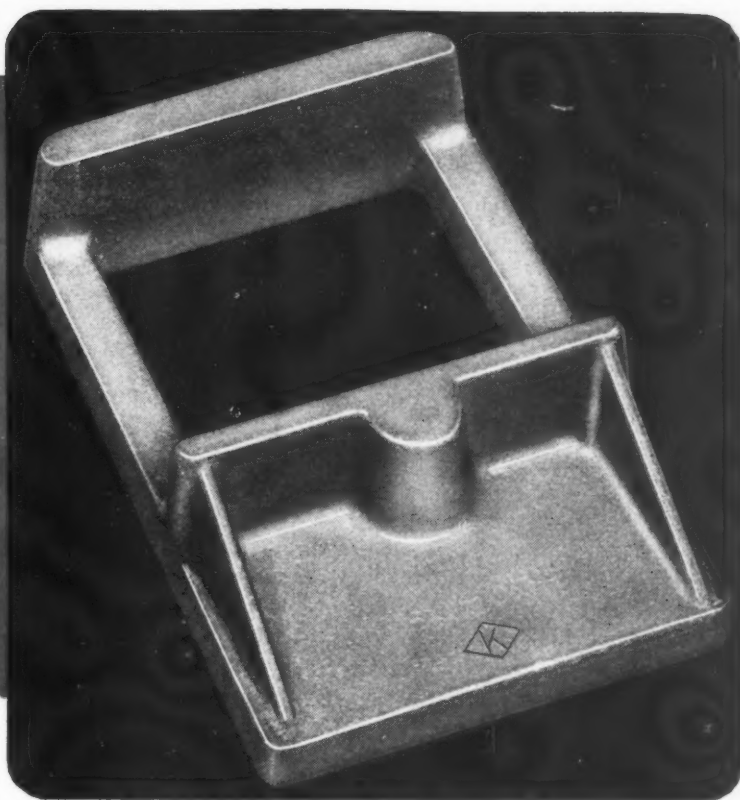
Several gaps in the same hole can be jumped in this manner. Considerable time is saved with this attachment. Why not investigate? Bulletin No. 850A tells the story.



LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.

Forgings Offer
5 MAJOR ADVANTAGES
Over Castings



Dependable Performance—Forgings provide ultimate strength and toughness, with maximum resistance to tensional, torsional and compression stress, and high resistance to impact and shock loads.

Longer Service Life—Forgings embody the highest obtainable fatigue resistance—the determining factor in the ultimate life of machine and equipment parts which are subject to repeated stress in continuous service.

Freedom from Breakdowns—The greater strength of forgings makes their liberal use the soundest possible insurance against breakdowns, down time for repairs and high maintenance costs.

Production Advantages—Forgings generally require less time to machine and finish, as the close tolerances obtainable leave a minimum of metal to be removed, resulting in lower machining and tooling costs. Weight is saved through the greater strength of forgings, which permits the use of thinner metal sections.

Available Now—Most types of forgings are quickly available without delays waiting for patterns, pouring or cleaning facility. **DON'T WAIT FOR CASTINGS—LET US HELP YOU CONVERT YOUR JOBS TO LOW COST FORGINGS.**

KROPP FORGE COMPANY

5301 W. Roosevelt Road • Chicago 50, Illinois

Refer to Your Local Phone Directory for Kropp Forge Engineering Service in Atlanta, Birmingham, Buffalo, Cedar Rapids, Chicago, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, New York, Portland, Rockford, St. Louis, St. Paul, San Francisco, Seattle, South Bend, Tulsa, Canada: Montreal, Toronto, Vancouver, Winnipeg. European Representatives: New York; Paris, France; Stockholm, Sweden.



KROPP

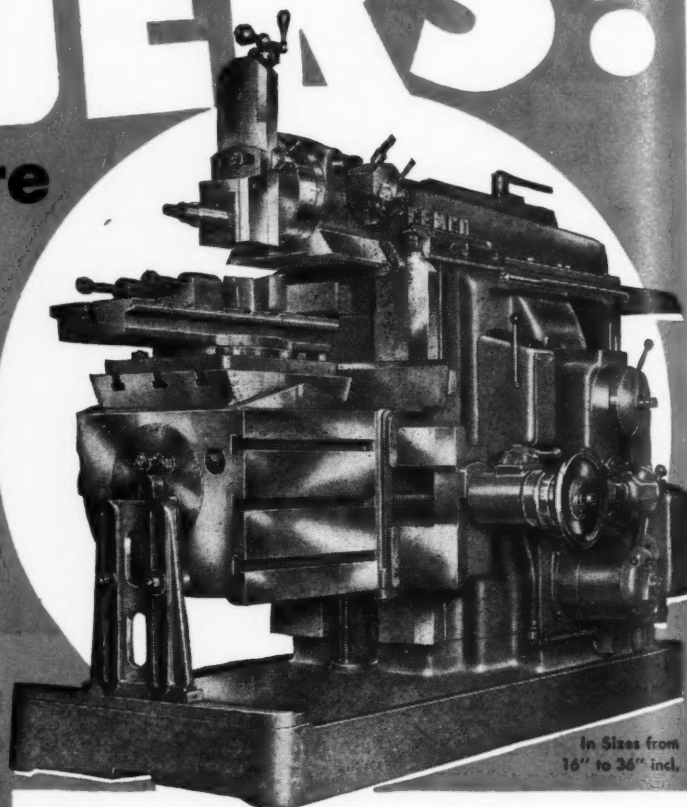
**"FORGINGS
 TO EVERY
 SPECIFICATION"**

LEADERS!

Because They're
**PRECISION
BUILT!**

GEMCO

Multi-Purpose SHAPERS



In Sizes from
16" to 36" incl.

HERE illustrated is another of many dependable and efficient machine tools that contribute to the high degree of accuracy and easy, quiet, smooth running operation so characteristic of GEMCO Shapers.

All GEMCO transmission gears are, after cutting, shaved in order to assure smoothness and quietness when in operation.

Longer satisfactory service life is assured since the precision finish of the gears eliminates undue wear.

In addition, GEMCO Shapers offer many other time tested features: Force-feed lubrication system with exclusive "Lubrigard" safety protection, twin-type bull or main gears, centralized controls, large, easily readable dials, wide range of feeds and speeds—all of which either increase the precision life, save time, or increase production.

Cut costs and produce better work with GEMCO Shapers!

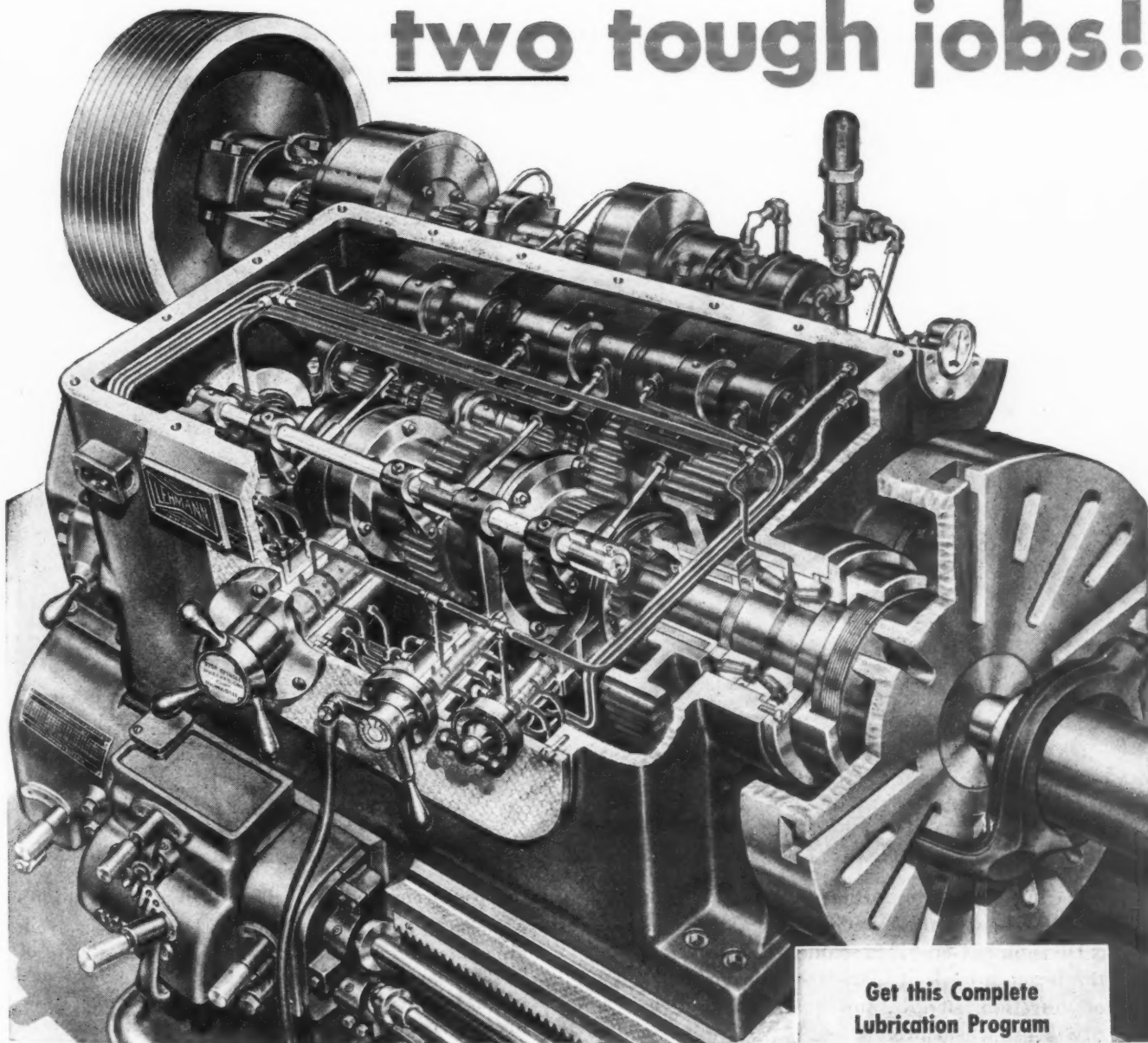
Write Today for BULLETIN GC-12M

**QUALITY MACHINES
PRODUCE
QUALITY MACHINES!**

GENERAL
ENGINEERING & MFG. CO.
ST. LOUIS 16, MISSOURI

★
Manufacturers
of
**PRECISION
MACHINERY**
Since 1917

Here one oil does two tough jobs!



Drawing prepared with cooperation of Lehmann Machine Co.

THIS ingenious variable-speed lathe poses a double problem for oil. For the same oil serves as both a hydraulic medium for the sensitive controls and as a lubricant for all headstock gears and bearings.

Both of these jobs require an oil with high chemical stability. Inside the hydraulic system, the oil must resist formation of deposits that clog lines, valves and clutch and brake mechanisms. On the gears and bear-

ings it must fight off oxidation, due to continuous splashing and churning in the presence of air. Also, it must maintain strong films to minimize wear.

Many machine tool manufacturers now recommend Gargoyle Vacuoline Oil because of its high stability in double-duty service of this nature. It helps maintain the accuracy of the machine and reduces wear over long periods of continuous service. Ask your Socony-Vacuum Representative for facts.

Get this Complete Lubrication Program for all your machines

- Lubrication Study of Your Entire Plant
- Recommendations to Improve Lubrication
- Lubrication Schedules and Controls
- Skilled Engineering Counsel
- Progress Reports of Benefits Obtained



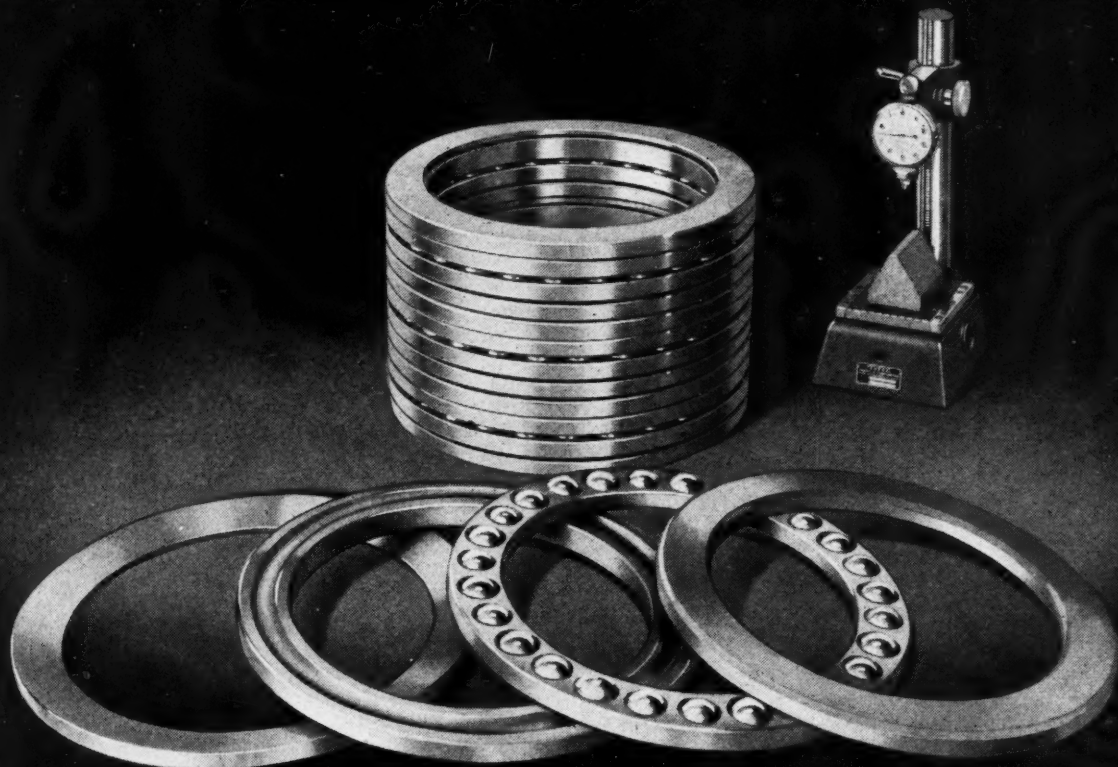
Socony-Vacuum Oil Co., Inc.

and Affiliates: Magnolia Petroleum Co. • General Petroleum Corporation

TUNE IN "THE MOBILGAS PROGRAM"—MONDAY EVENINGS, 9:30 E.S.T.—N.B.C.

Contact **KAYDON** of Muskegon

FOR ALL TYPES OF BALL AND ROLLER BEARINGS 4" BORE TO 120" OUTSIDE DIAMETER



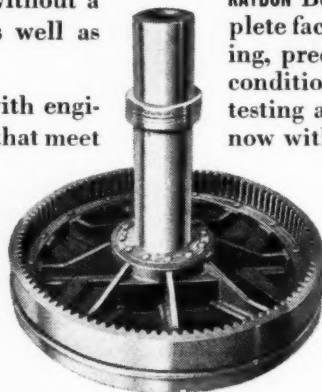
Getting More Car Wheel Output Per Day

KAYDON bearings are an important factor in helping the big Car Wheel Lathes, made by The Niles Tool Works Division of General Machinery Corporation, take the heaviest feeds at highest speeds without a sign of vibration, stepping up quality as well as quantity of car wheel production.

In many industries KAYDON is cooperating with engineers in designing and producing bearings that meet

the requirements of machinery to step up output. Counsel in confidence with KAYDON. Capacity is available now for production of all types and sizes of KAYDON Bearings. In addition, KAYDON also offers complete facilities for atmospheric-controlled heat treating, precision heat treating, salt-bath and sub-zero conditioning and treatment, microscopy, physical testing and metallurgical laboratory services. Plan now with KAYDON.

KAYDON Self-Aligning Ball Thrust Bearings, 15.031" x 19.500" x 4.000", take the end thrust on face spindles of big Niles Car Wheel Lathes.



Showing location of KAYDON thrust bearings on each spindle in relation to the face plate and driving gear.

THE KAYDON ENGINEERING CORP.
MUSKEGON • MICHIGAN

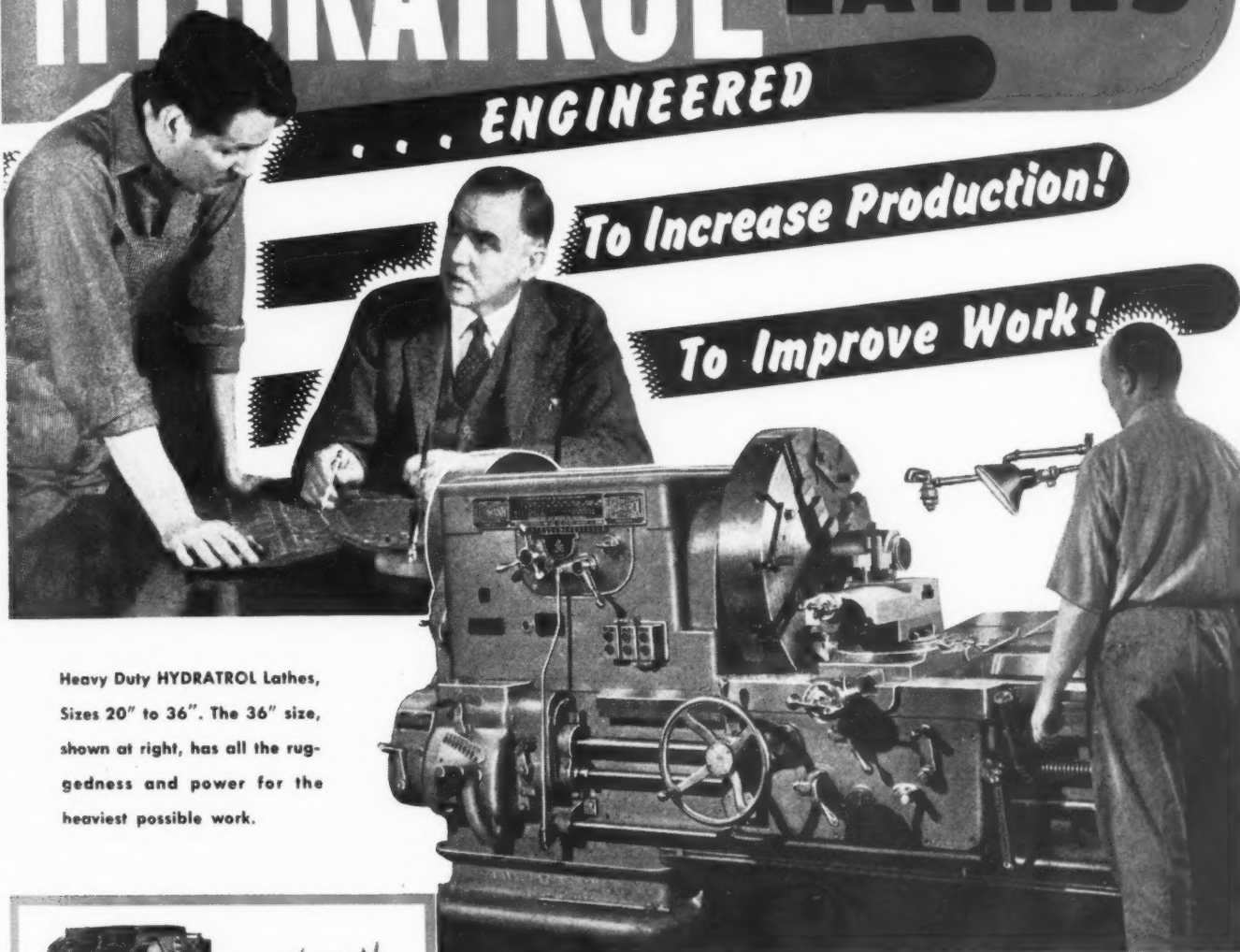
KAYDON Types of Standard or Special Bearings:
Spherical Roller • Taper Roller
Ball Radial • Ball Thrust
Roller Radial • Roller Thrust

HYDRATROL LATHES

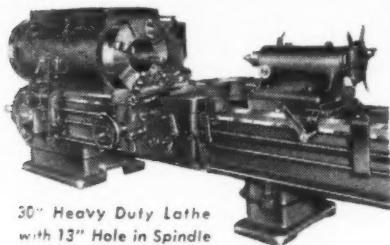
... ENGINEERED

To Increase Production!

To Improve Work!



Heavy Duty HYDRATROL Lathes, Sizes 20" to 36". The 36" size, shown at right, has all the ruggedness and power for the heaviest possible work.



30" Heavy Duty Lathe with 13" Hole in Spindle

LARGE HOLLOW SPINDLE TYPE 5 SIZES—18" to 36"

Small 18" up to 7 1/8" Hole
Medium 24" up to 12 1/8" Hole
Large 27" up to 13 1/8" Hole
Large 30" up to 14 1/8" Hole
Large 36" up to 16 1/2" Hole

(Standard type lathes, 16" to 36")

Do It Better - on a HYDRATROL!

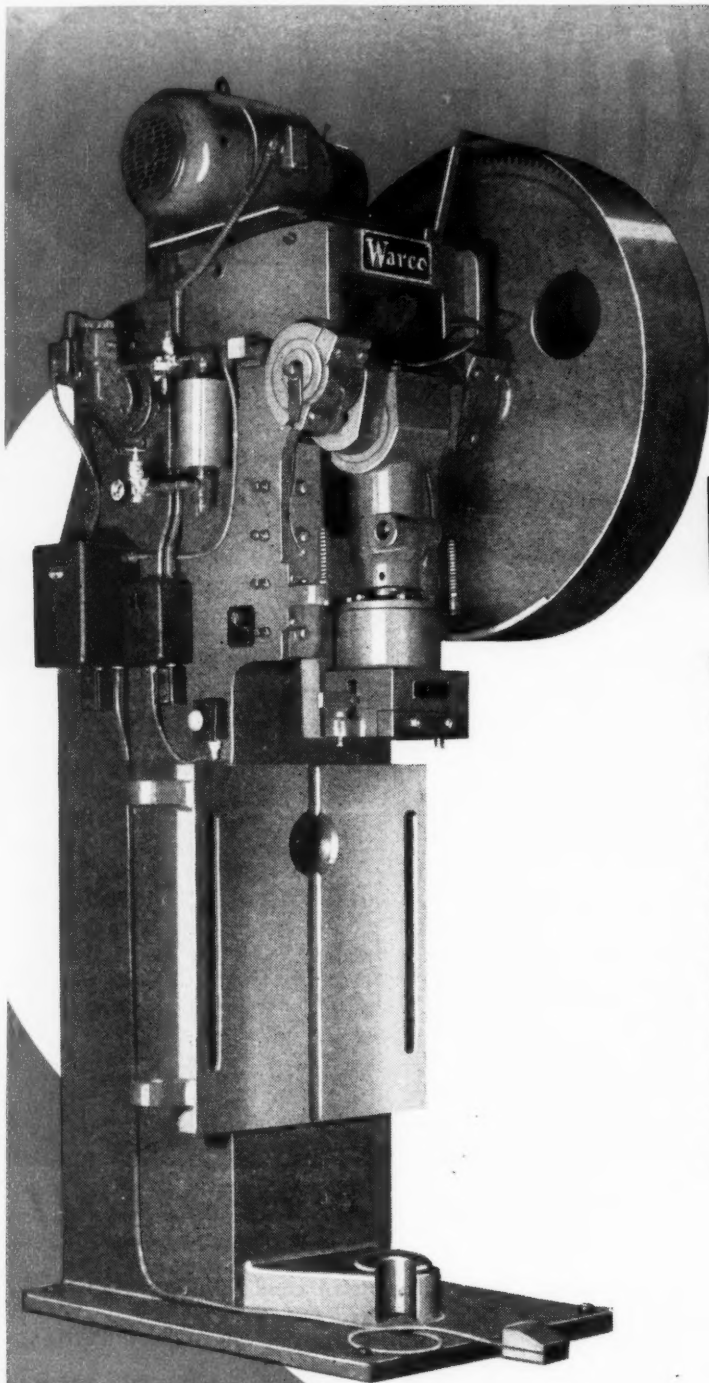
IN hundreds of plants — under all sorts of conditions — LEHMANN HYDRATROL LATHES have invariably brought about faster production, better work, lower costs.

Look around your own shop — you may find a number of machining jobs which possibly could be done better on a Heavy Duty Type of HYDRATROL LATHE, as pictured above. Send us prints of these unusual, difficult, or too-costly machining jobs, for a specific, time-and-money-saving recommendation.

MOVIE SOUND FILM, in natural colors, available, showing functions of Hydratrol Lathe, advanced construction features, and production machines in operation. Ask the Lehmann representative for a showing.

Lehmann MACHINE COMPANY

CHOUTEAU AT GRAND . . . ST. LOUIS 3, MISSOURI



HORN PRESS

Capacity range, 50 to 200 tons, stroke range, 4 to 14 inches; especially suited for all horn-ing and wiring operations. Single-gear, electrically controlled. Friction clutch and brake unit.

Warco

PRESSES

WELDED STEEL CONSTRUCTION

Weldments Fully Stress-Relieved

Workmasters For Your Production Line

Rigidity, strength, accuracy, power, endurance . . . all of these "primaries" of press design have been carefully engineered into the new line of Warco presses to make them dependable work-masters on your production line.

Standard models will handle virtually any require-ment for stamping, drawing, blanking or coining. Welded steel construction, with all weldments stress-relieved, permits special features of design desired for special manufacturing.

Warco's complete engineering service and excep-tionally large factory facilities are available to give you prompt delivery. Your inquiry or order will receive immediate attention. *Arrange to visit our plant and see how Warco presses are made.*

A complete line of

2-Point Eccentric Gear Presses
Straight-sided Hydraulic Presses
Open Back Inclined Presses
Mechanical Press Brakes

WARREN CITY MANUFACTURING Company

1954 Griswold Street • Warren, Ohio

A Subsidiary of The Federal Machine and Welder Company
Offices in Principal Cities



Double Crank Straight Side Press



Two Point Eccentric Gear Press



Press Brake



200 Ton Press



Hydraulic Press



75-Ton 80° Press



Horn Press



Double Crank 80° Press

NATIONAL END MILLS



Choose the Right Tool for the Job

In tooling up for end milling operations, each job must be considered individually to get the best final results. For hard materials or shallow cuts, or if an exacting finish is required, fine tooth End Mills should be used. For softer materials or deep cuts, coarse tooth End Mills will prove more efficient.

End Mills are manufactured in various combinations of spiral and cuts. Each is designed for a definite purpose. Your NATIONAL distributor will help you select the End Mill best adapted to your problem. Consult him on all your metal-cutting needs.



*Call
Your*
DISTRIBUTOR!

Leading distributors in every section of the country have stocks of National Cutting Tools. Every National distributor offers factory-trained engineers to serve you. Call your National distributor for cutting tools or any staple industrial product.

NATIONAL



TWIST DRILLS
REAMERS, HOBS
MILLING CUTTERS
COUNTERBORES
SPECIAL TOOLS
END MILLS

TWIST DRILL AND TOOL COMPANY

ROCHESTER, MICH., U.S.A.

Tap and Die Division — Winter Bros. Co.

Factory Branches • New York • Chicago • Detroit • Cleveland • San Francisco • Distributors in Principal Cities



Amazing Adjustable Thread Ring Gage

Starts round



Stays round



5-PLUS FEATURES

- 1** Accurate and stable
- 2** Long wear life
- 3** Light weight
- 4** Positive identification
- 5** Positive adjustment

A NEW WAY to cut inspection costs—shift to the New Woodworth Adjustable Thread Ring Gage.

The design of this gage gives you long life accuracy, never before possible with conventional thread ring gages. Because of the accuracy, gage life is increased many times. One large plant is getting 12½ times longer service than with the old style gages.

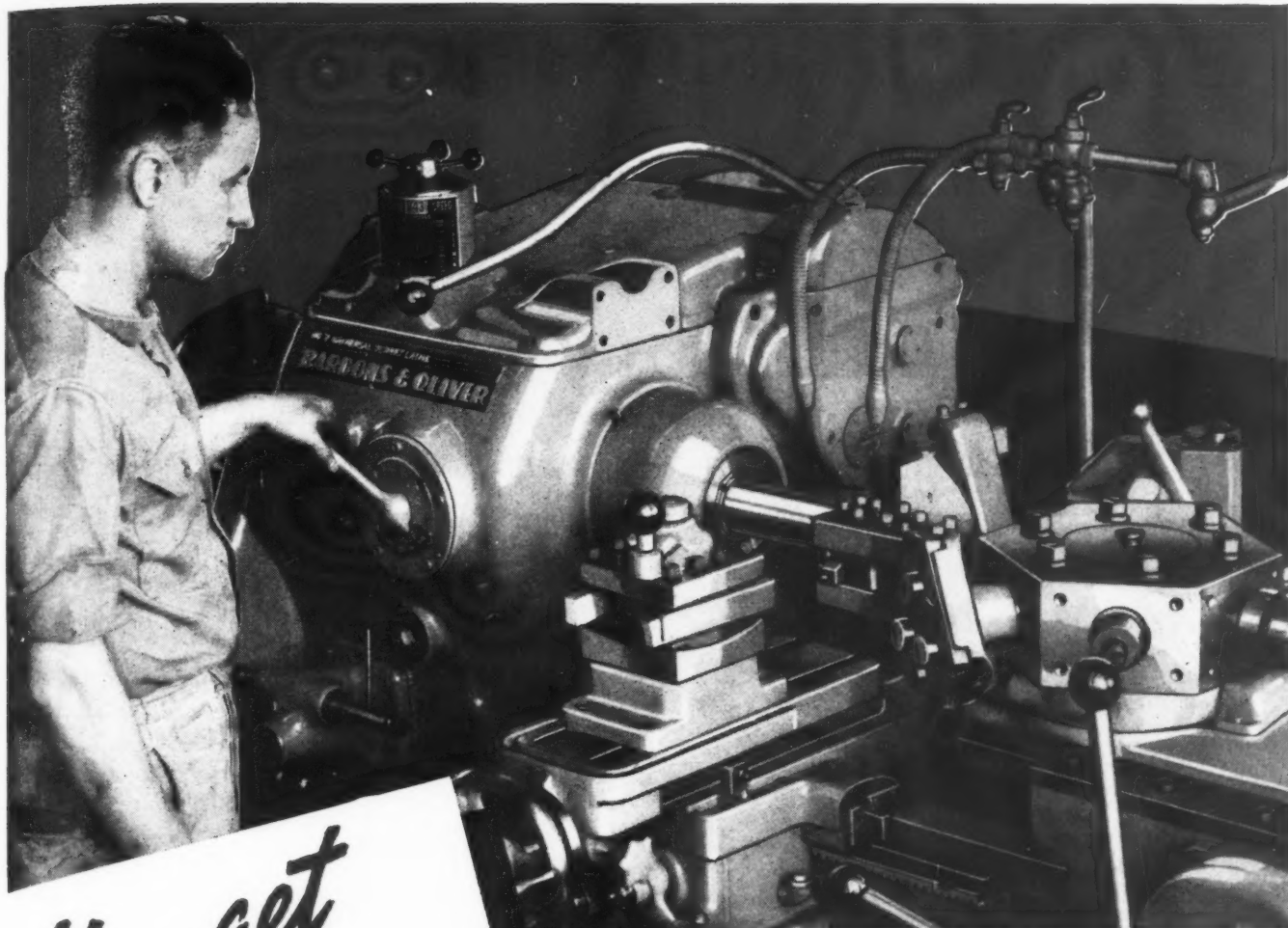
Think what this will mean to your inspection costs.

ACCURACY YOU CAN TRUST

WRITE FOR FOLDER 46R

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN
PRECISION GAGES • PRECISION MACHINED PARTS • DIAPHRAGM CHUCKS • ADJUSTABLE CLAMPING JIGS • SPECIAL TOOLS



*You get
More Pieces
Per Day—*

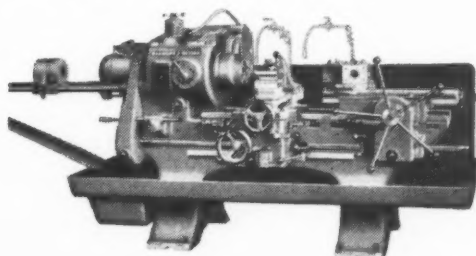
**WITH THIS NEW POWER
COLLET CHUCK
AND BAR FEED**

Feeding the bar and closing the chuck by hydraulic power increases production on a Bardons & Oliver No. 7 Universal Turret Lathe.

Quick, wrist-flick control saves time between cuts. Stronger grip of collet on the bar permits heavier feeds for decreased machining time.

Increased operator efficiency is the result of the eliminating of brute strength for chuck closing which causes fatigue and errors.

Investigate the possible savings in your plant from the use of this latest improvement of the Bardons & Oliver No. 7 Turret Lathe. Full details sent on request, or a representative will call.



BARDONS & OLIVER, INC.

1133 WEST 9TH STREET • CLEVELAND 13, OHIO

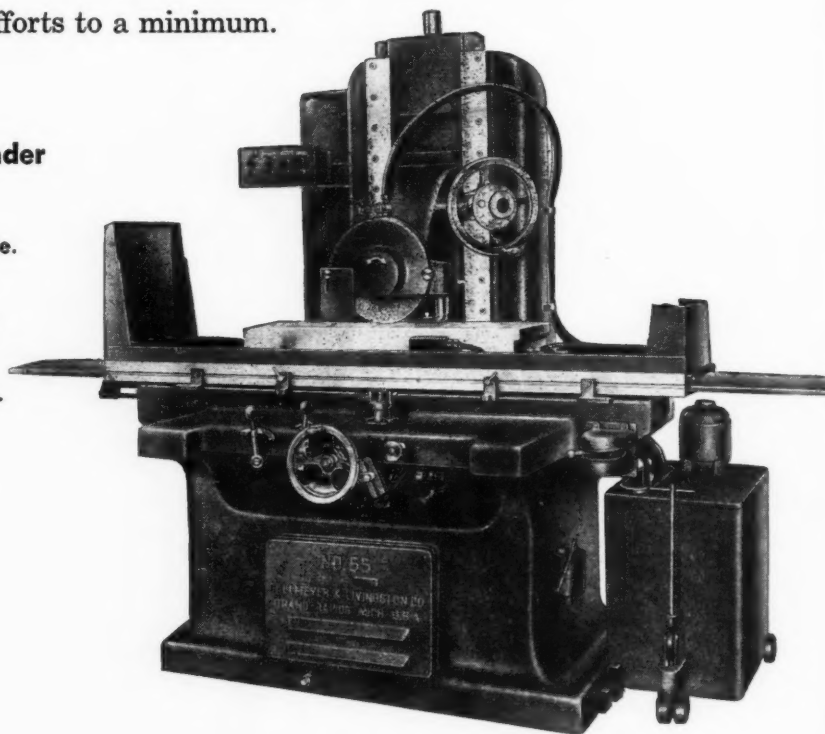
FASTER PRECISION PRODUCTION

125 feet per minute longitudinal table speed with G & L's GRAND RAPIDS No. 55 Surface Grinder

Only GRAND RAPIDS Hydraulic Feed Surface Grinders provide such exceptional table speed. Both the longitudinal table travel and the cross feed are automatic, hydraulically actuated. The wheel head is powered for rapid vertical travel. Automatic and powered movements of the Grand Rapids 55 cut the operator's efforts to a minimum. Magnetic chucks are available.

The Grand Rapids No. 55 Surface Grinder combines ALL these advantages:

- ★ Longitudinal table speed of 125 feet per minute.
- ★ Integral cast column and base assures permanent alignment of vertical head ways and cross saddle ways.
- ★ Starters, controls and motors easily accessible.
- ★ Two spindle speeds, reduce wheel costs.
- ★ Patented vertical movement of wheel head.
- ★ Bijur one-shot lubrication system.
- ★ Special G & L spindle motor end-bells and over-size precision ball bearings.
- ★ Vickers vane type hydraulic pump.
- ★ Portable, self-contained motor-driven coolant system.



SPECIFICATIONS:

Automatic Table Travel—longitudinal 38", transverse 13½".
Working surface of table—12" x 36".
Standard wheel size—12" x 1" x 3".
Vertical movement of wheel head—18".
Spindle speeds—1925 and 2500 RPM.
Floor space—150" wide x 102" deep.

Write for catalog GL 101



What "GRAND RAPIDS" Quality Means: G & L cast their own close-grained gray iron, machine all parts to micrometric tolerances, and precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means top quality in Hydraulic Feed Surface Grinders.

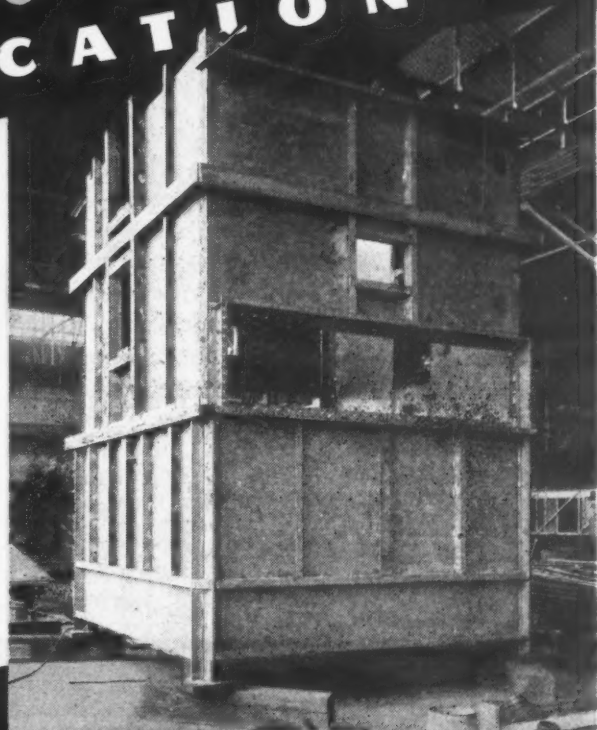
GALLMEYER & LIVINGSTON COMPANY, 305 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

Steel-Weld

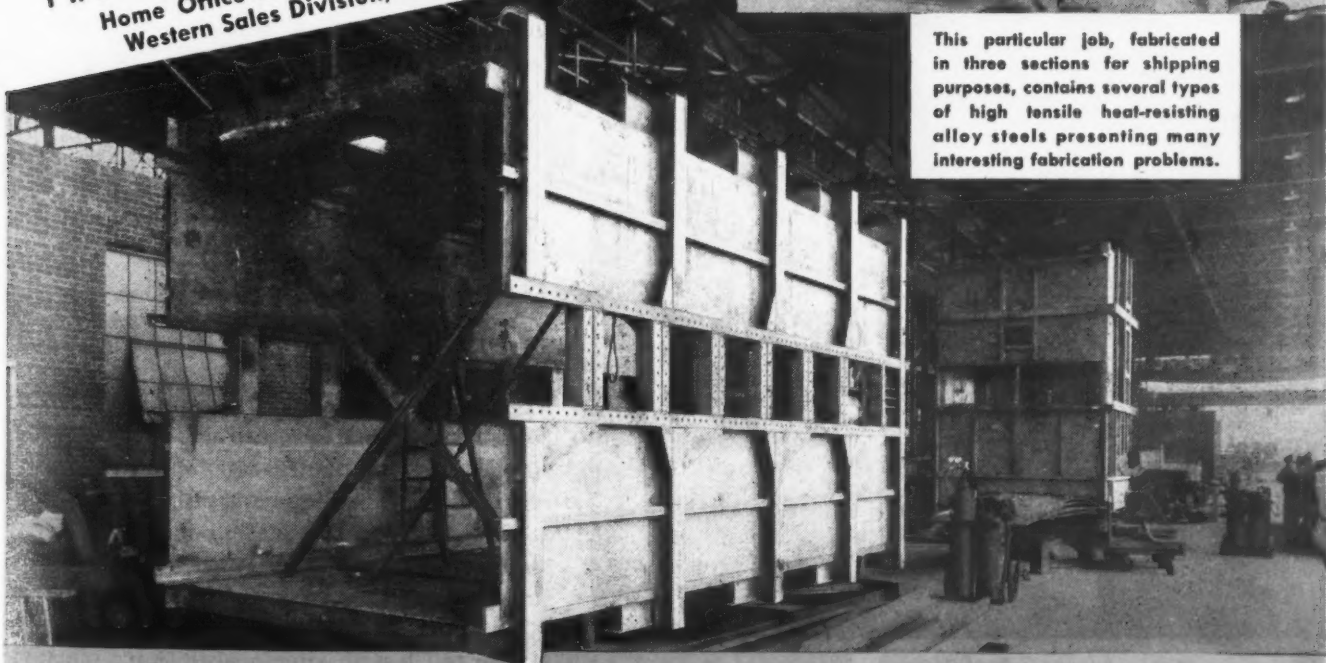
FABRICATION

The plant equipment of The R. C. Mahon Company includes every modern device known today to facilitate welded steel fabrication . . . this, coupled with plant capacity for heavy fabrication of any shape, size or weight provides you with an excellent source for your requirements large or small. A staff of design engineers and highly skilled craftsmen, in the Steel-Weld Division, are maintained to assure you every advantage of Steel-Weld Fabrication.

Address STEEL-WELD DIVISION
THE R. C. MAHON COMPANY
 Home Office and Plant, Detroit 11, Michigan
 Western Sales Division, Chicago 4, Illinois



This particular job, fabricated in three sections for shipping purposes, contains several types of high tensile heat-resisting alloy steels presenting many interesting fabrication problems.



MAHON

Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

STILL LOOKING INTO THE FUTURE

YESTERDAY...

wirebrushing was tops

Yes... yesterday wirebrushing structural steel to prepare a base for shop coats was the method preferred by steel fabricators. But it had its drawbacks: It was costly... slow... primer coats cracked and lifted, and had to be replaced at frequent intervals.



TODAY...

*it's flame cleaning
and dehydrating!*



Now, better bases for protective coatings on structural steel are prepared rapidly by this modern oxyacetylene process which slashes costs more than 75%. Developed by Airco in cooperation with a large steel fabricator, flame cleaning and dehydrating completely frees the surface of rust and scale... drives out all hidden moisture and produces a dry and warm surface from which primer coats will not crack and lift.

AND TOMORROW...?

You can look ahead to new and even more important developments to aid the metal working industry — thanks to Airco's accelerated research and development program.

The facilities of our Technical Sales Division are available to all metal working men in applying Airco processes in the solution of their problems. For additional information, get in touch with your nearest Airco office or write: Air Reduction, 60 E. 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas.



AIR REDUCTION

Offices in All Principal Cities

ORIGINATORS OF MODERN OXYACETYLENE METHODS FOR THE METAL WORKING INDUSTRY

PRODUCTION MACHINES THAT *Sell Goods*

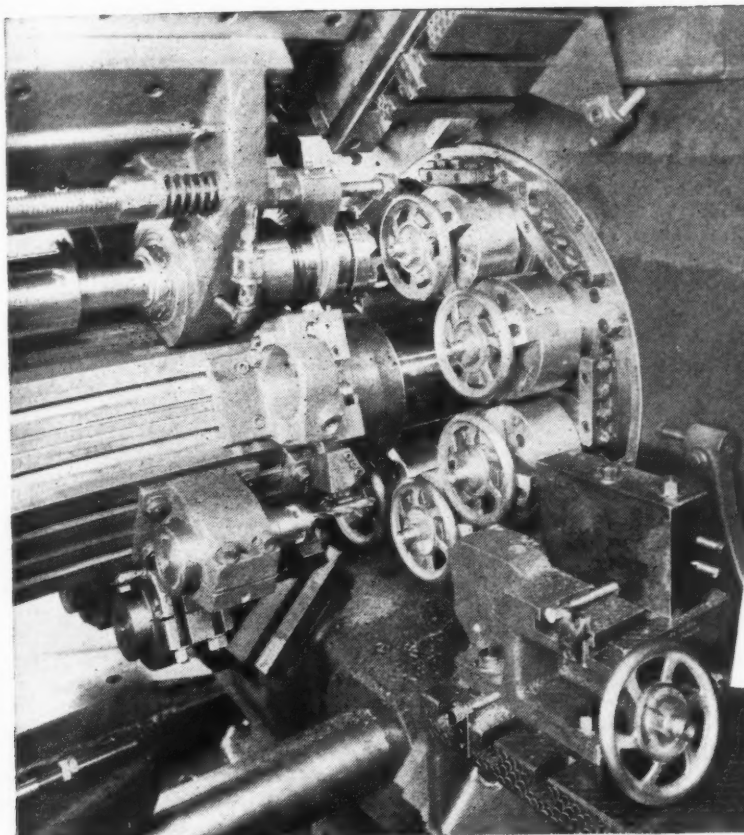


Example of MODERN COST CUTTING

This sewing machine hand wheel, of cast iron, requires 16 operations for finishing. The entire job is done on an Acme-Gridley 6" RPA 8-Spindle Chuckler in 44 seconds.

Carbide tipped tools are used for the forming and turning cuts.

Two machines do this job, and fourteen other important jobs, with a simple change of tooling. That's versatility—and economy.



Respect from the Sales Department has been earned, in many a business, by Acme-Gridley 4, 6 and 8 Spindle Bar and Chucking Automatics.

These truly modern production machines turn out precision metal parts **FASTER**. They help keep costs down—a highly important fact in these times of

advancing material prices and higher wage rates.

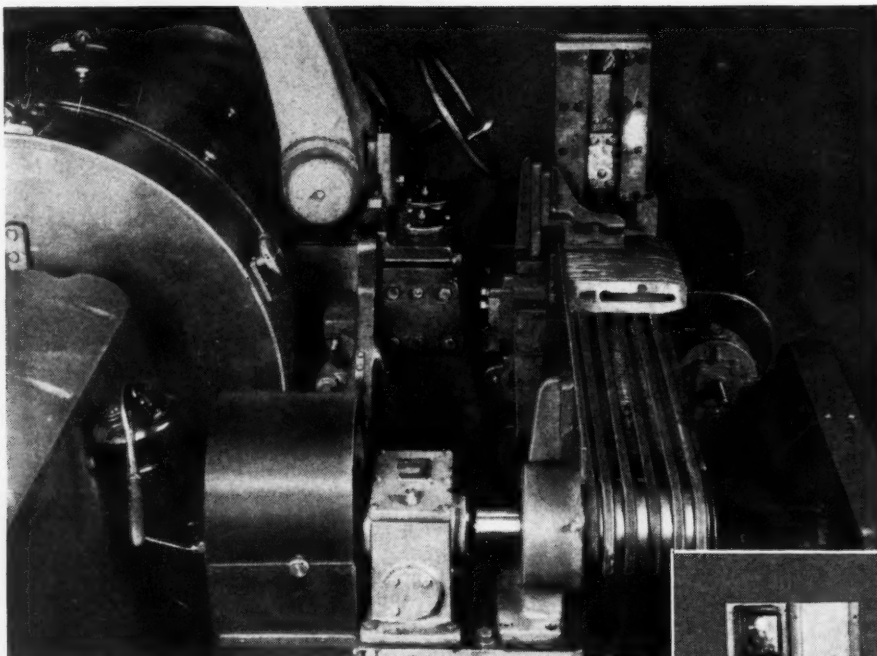
The result, for the Sales Department, is either a lower selling price, to attract business, or a better margin where selling prices are standardized. *Your* Sales Department is interested in having you get complete Acme-Gridley information.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

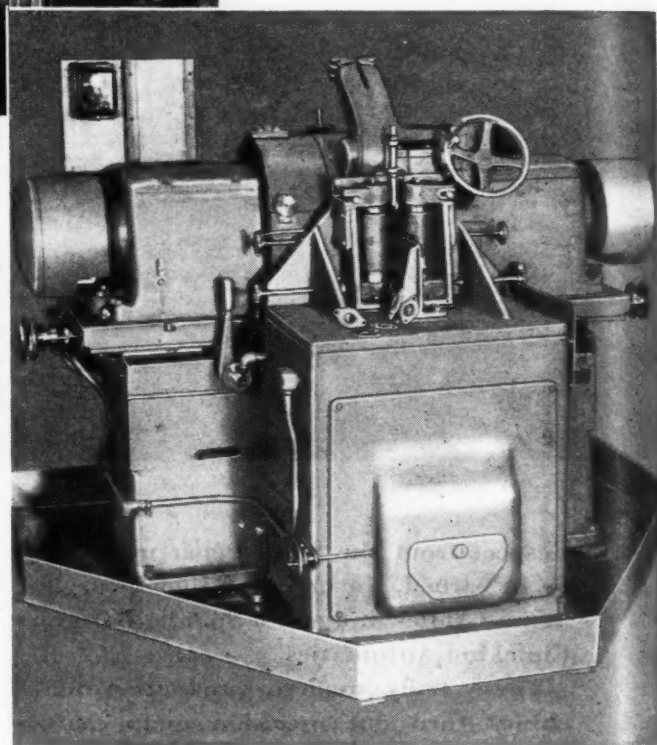
Acme-Gridley Bar and Chucking Automatics:
1-4-6 and 8 Spindle • Hydraulic Thread
Rolling Machines • Automatic Threading Dies
and Taps • The Chronolog-Limit, Motor Starter
and Control Station Switches • Solenoids
Centrifuges • Contract Manufacturing

6000 SURFACES PER HOUR S

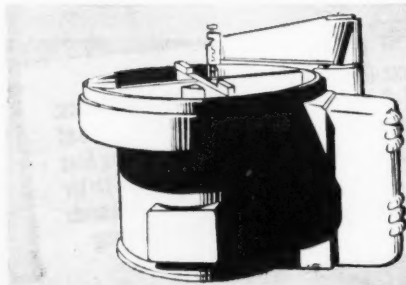


1000 CARPENTER BLADES PER HOUR

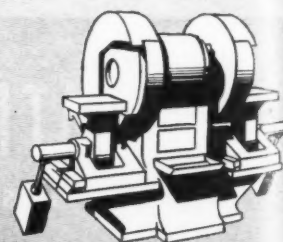
are fed into this grinder by a special Hanchett engineered fixture. A gang of V-belts carries plane blades on edge to a magazine. Blades are then fed, one at a time, to a flat belt, which carries them between two rubber rolls. These rolls "walk" the blades "straight through" between grinding wheels. Broad surfaces are finished flat and parallel, in three passes—6000 face grinds an hour. Tolerance within .002", stock removal about .025" total.



HANCHETT OFFERS 15 DISC GRINDERS for a



The NO. 153 VERTICAL SPINDLE GRINDER is a heavy, rigid machine for grinding flat surfaces on parts, the final dimensions of which need not be held to close limits. It is ideal for finishing gear covers, stove doors, foundry flasks and similar parts. Very high production rates can be achieved. The machine is sturdily constructed for long life and trouble-free service.



R Straight Through

Where the Problem is High Production and Fine Surfacing, DISC GRINDING by HANCHETT IS THE ANSWER

A huge variety of smaller parts—piston rings, bearing races, file blanks, thrust plates, small housings and miscellaneous castings, to mention only a few—can be finished by disc grinding with remarkable savings in production time and unit cost. Tolerances as low as .0002", flat and parallel, can be achieved. Slight changes in design enable manufacturers to replace several complex machining operations with a single disc grinding process. Time savings on finish operations of 500% per unit, and up, are common. Hanchett builds the following disc grinders:

Six double spindle models. These may be equipped with three types of machine feed fixtures, reciprocating (hand or power), rotary and "straight through".

Six single spindle models, for use where production requirements are moderate. Hand and auto feeds.

One verticle spindle model, for production jobs where tolerances need not be too fine.

Two automatic single wheel grinders, for high output and closer tolerances.

There is a Hanchett grinder to get the unit-per-hour production you need—with tolerances and finish to meet your "specs." Hanchett Engineers will design, build special fixtures to solve your production problems.

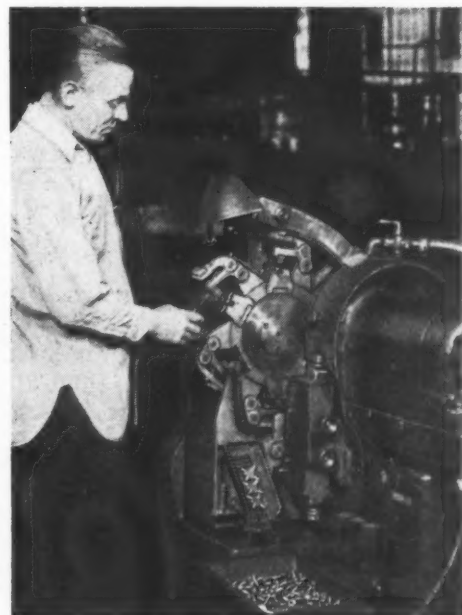
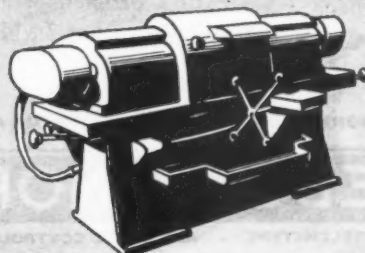
The Hanchett line includes over fifty machines—you are assured of unbiased recommendations and the utmost in production economy, when you choose GRINDING by HANCHETT.



HANCHETT
MANUFACTURING CO.
BIG RAPIDS MICHIGAN
REPRESENTED IN LATIN AMERICA BY MACHINE AFFILIATES, INC.

WIDE RANGE OF PRODUCTION JOBS

HANCHETT SINGLE SPINDLE GRINDERS are made in six models in various sizes with grinding wheel diameters ranging from 12" to 40". Each grinder carries two wheels, one at either end of the spindle so that two operations may be carried on simultaneously. Extremely flexible, these single spindle machines cover all requirements for heavy and special tool grinding as well as an endless variety of production jobs.



750 PIECES PER HOUR

That's what Hanchett Engineers had to grind to meet production requirements in finished universal joint spiders as shown above. A special 8-station rotary drum fixture was devised to finish the 3" spiders accurately in length—and square with one another in parallel planes—to a tolerance of .0005" Two opposite surfaces were ground simultaneously.

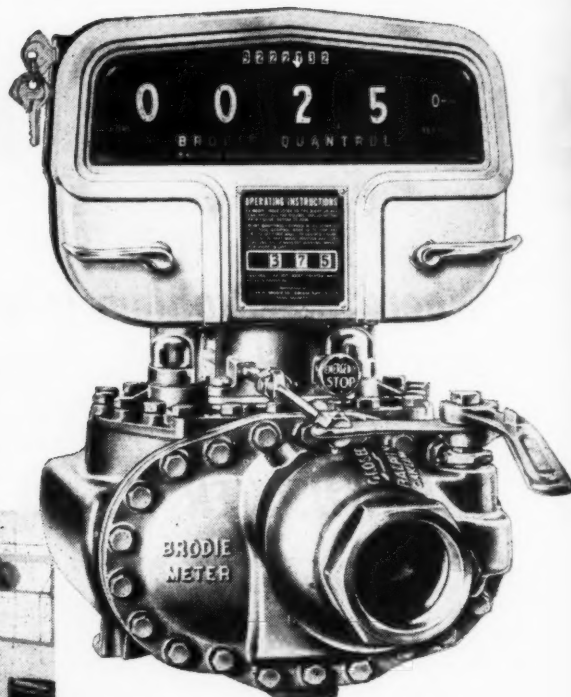
YOURS FOR THE ASKING—complete, detailed bulletin on each type of machine—No. 640-IM, the Double Spindle Grinders; No. 546-IM, Single Spindle Machines; No. 746-IM, the Vertical Spindle Grinder. Write direct or see your nearest Hanchett Dealer about GRINDING by HANCHETT

HANCHETT DOUBLE SPINDLE GRINDERS are used for grinding two opposite parallel surfaces at the same time. Work is passed between the grinding wheels utilizing methods ranging all the way from simple hand holders to elaborate power-driven mechanisms comprising variable speeds, automatic sizing devices and magazine feeds. The standard model is provided with table for hand feed.

LOW-REJECT Heat-Treatment for HIGH-QUALITY PARTS



Accurately-finished parts, made of Nitriding alloy, being lowered into Homo Nitriding Furnace for thorough, accurate heat-treatment.



Brodie Quantrol positive - displacement meter for petroleum products. Its parts are heat-treated by Homo Methods to assure accurate operation. The big-capacity, modern Brodie Heat-Treat Dept. is shown at left.

In making meters for gasoline, etc., the Ralph N. Brodie Co. of Oakland, California, faces two heat-treating problems familiar to hundreds of manufacturers—they must have high quality and they want few rejects. Brodie solved the problems as hundreds of others have done—by the Homo Methods.

All Homo Method equipments, whether for Tempering, Carburizing, Gas-cyaniding or Nitriding have "foundation-stone" features which the Homo Method pioneered. All heat the parts with great uniformity, and are especially good for big or dense loads. All have fully-automatic control; all have large capacity per foot of floor space.

Around these foundation qualities we design the various specialized Homo equipments. Atmospheres, materials, sizes, etc., are handled with accuracy and precision. High quality heat treatment, with low cost, is the result of this thoughtful, thorough design and construction.

We'd like you to put up to our engineers any parts heat-treating problem you may have, so they can show you in detail just what L&N methods can do.



LEEDS & NORTHRUP COMPANY, 4921 STENTON AVENUE, PHILADELPHIA 44, PA.

LEEDS & NORTHRUP

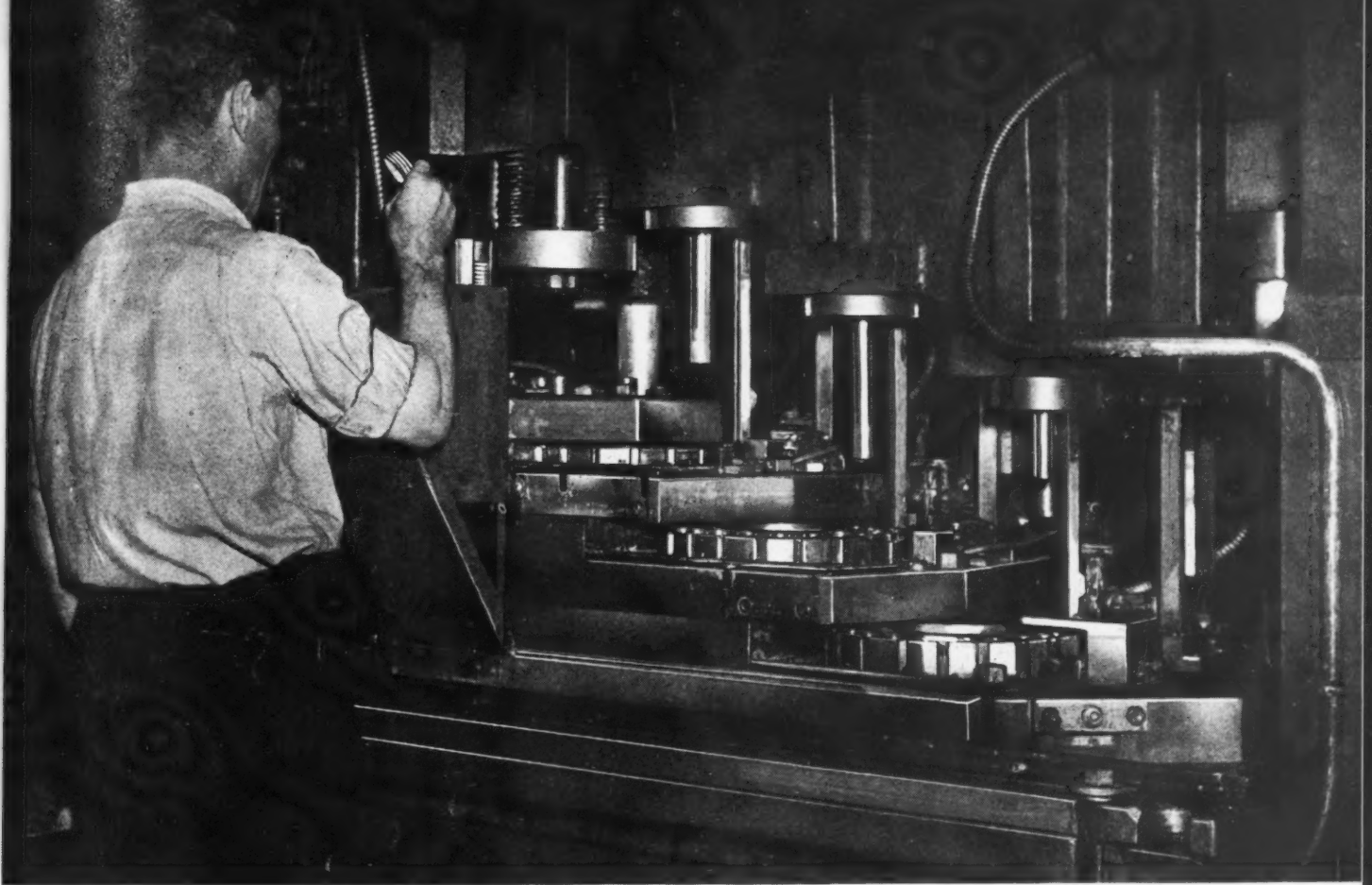
MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

Jrl. Ad T-620 (24)

DECEMBER, 1946

MACHINERY

VOL. 53 • NO. 4



Ingenious Work-Transfer Mechanisms for Progressive Dies

Salient Features of Unique Dies and Their Feeding Arrangements, Designed by Ford Engineers for Performing as Many as Ten Press Operations with One Handling of the Work

By CHARLES O. HERB

TOOL engineers are fully cognizant of the principle that most economical results are attained in mass production by the performance of a number of operations with one handling of the work. This principle has probably been utilized to its fullest extent in the operation

of machine tools. It is common practice, for example, to see a multiple-spindle drilling machine set up for drilling from twenty to eighty holes simultaneously, or an automatic screw machine tooled for taking twenty or thirty turning and boring cuts with one indexing of the machine.

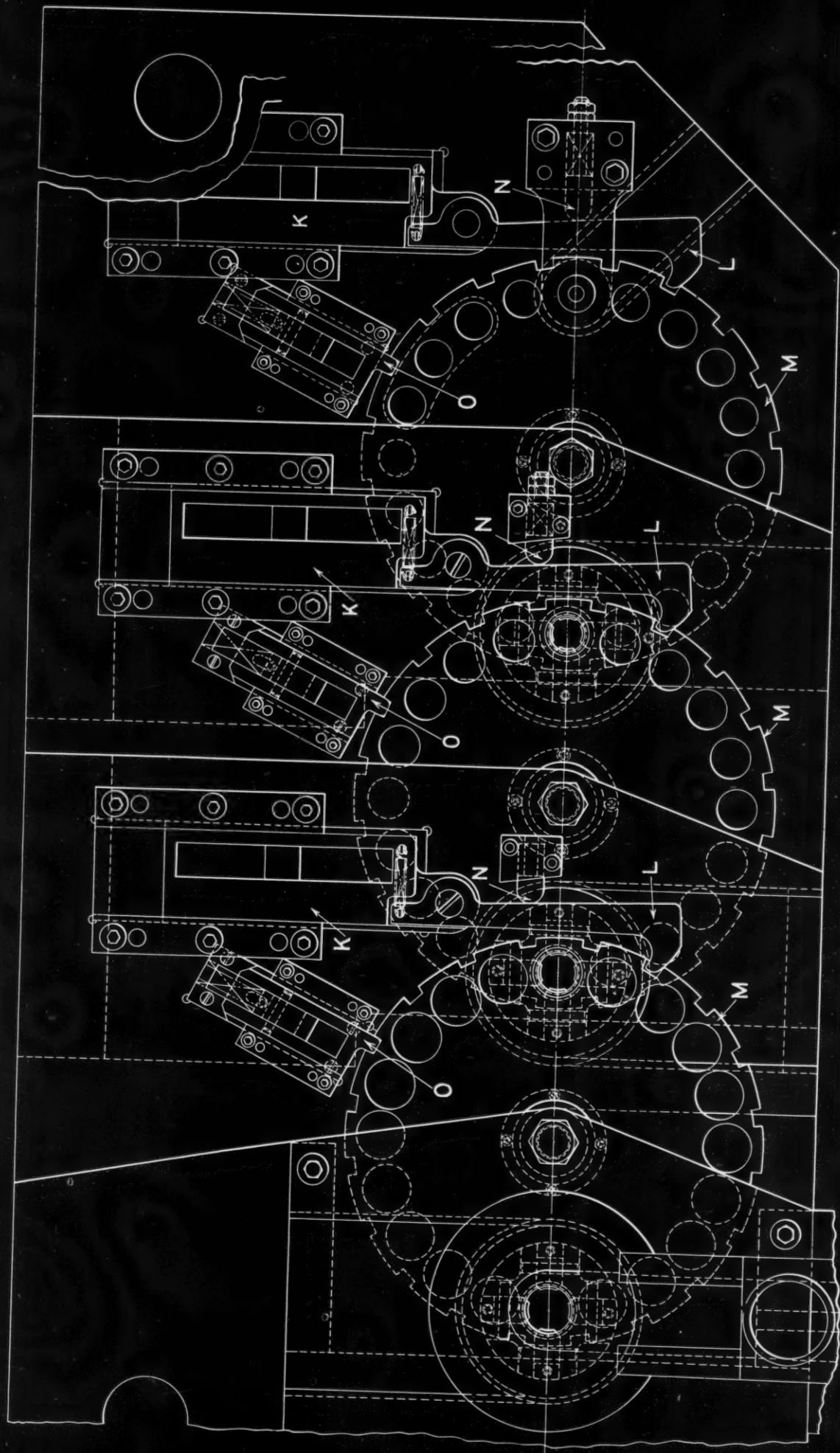


Fig. 1. Plan View of Rotary Indexing Dials Seen in Fig. 3, Showing also Punches, Dial Indexing Mechanisms, and Dial Locking Devices

AU

Fig.
for
whic
Dr

M
pre
ope
lin
for
pre
ma
rea
imp
dra
wit
han
of t
mu
ficu
and

P
atic
for
a h
of
mu
and
des
laic
the

T
uni
siv
ind

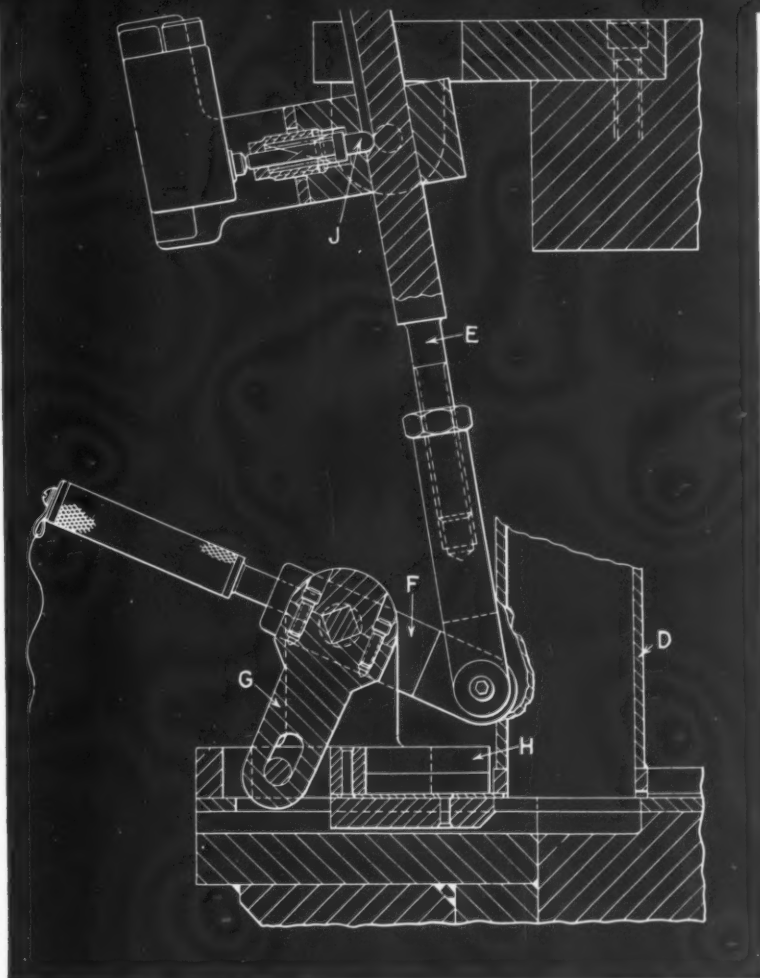
AUTOMATIC DIE FEEDS

Fig. 2. Diagram of Mechanism Employed for Feeding the Copper-plated Disks from which Push-rods are Produced to First Drawing Die of Set-up Shown in Fig. 3

Multiple die set-ups are utilized in press shops for performing a series of operations automatically with one handling of the work, although the performance of multiple operations on presses is not nearly so common as on machine tools, due to a number of reasons. For example, it is frequently impossible to perform more than a few drawing operations on sheet-metal parts without annealing the work to reduce hardness and brittleness. The problem of transferring work from die to die in multiple press set-ups also presents difficulties from the standpoint of design and space limitations.

Practically every multiple press operation requires dies designed especially for the individual job, and this calls for a high degree of ingenuity on the part of die designers. Several ingenious multiple die operations performed at the Rouge and Ypsilanti plants of the Ford Motor Co. are described in this article, particular stress being laid on the mechanisms employed for transferring the work-pieces from die to die.

The heading illustration and Fig. 3 show a unique set-up in which the work is carried successively through four operations by the use of rotary indexing dials arranged in the form of steps.



This equipment produces automobile engine push-rods from flat disks, correct as to the specified diameters within a total tolerance of 0.002 inch. The rate of production on this job is 10,000 in an eight-hour day. A disk and a completed push-rod are seen on the front of the press bolster in Fig. 3. The steel blanks are copper-plated prior to this operation to facilitate the several drawing steps. The operation is performed on a 250-ton straight-sided press.

Fig. 3. Multiple Die in which Work-pieces are Carried Automatically through Four Successive Operations by Means of Rotary Indexing Dials

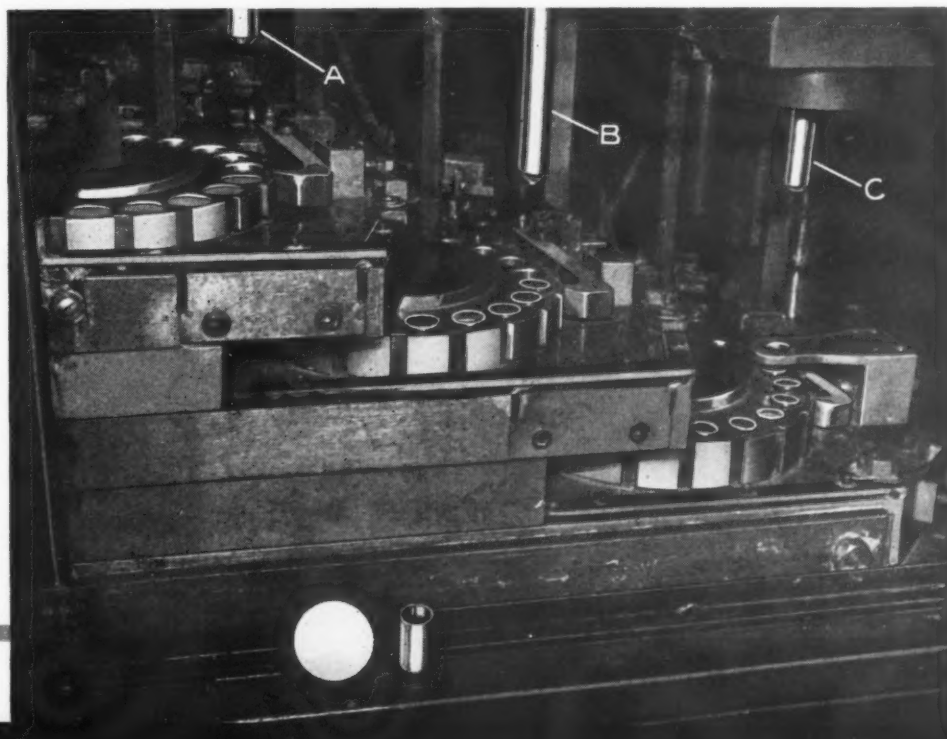




Fig. 4. General View of a Press Equipped with a Multiple Number of Dies Arranged in Tandem for the Production of Cylindrical Generator Frames

The disks are loaded flat into a vertical magazine, which may be seen directly in front of the operator's right hand in the heading illustration. A horizontal slide carries the disks successively to the center of the die in line with the first drawing punch. Three disks are always in line between the disk-feeding slide and the die. As each disk slips into the die it is nested to insure accurate location.

When the press ram descends, a blank-holder exerts pressure on the nested disk while the punch forms it into a cup. This blank-holder, being under spring tension, functions similarly to the blank-holder on a double-action press. The punch forces the cup completely through the die and into one of twenty openings spaced around an indexing dial. With each press stroke, this dial is indexed a distance equal to the spacing between two of the work carrying openings.

When each cup reaches a position diametrically opposite the point where it was loaded into the rotary dial, the cup is directly beneath the second drawing punch A, Fig. 3. This punch forces the cup down through the die beneath the dial and into an opening in a second rotary dial which is of the same design as the first. The second dial is also indexed with each up stroke of the press, carrying the work-pieces beneath the third drawing punch B.

The third punch also pushes the cup down out of the dial through a diameter-reducing die and into a third rotary indexing dial, which functions in the same manner as the two preceding ones. The work-pieces are indexed by this dial to a position beneath the restriking punch C. This punch acts on the cups while they remain in the third rotary dial. They are ejected from the dial as the punch rises by an ingenious mechanism beneath the rotary dial which operates vertically through openings in the

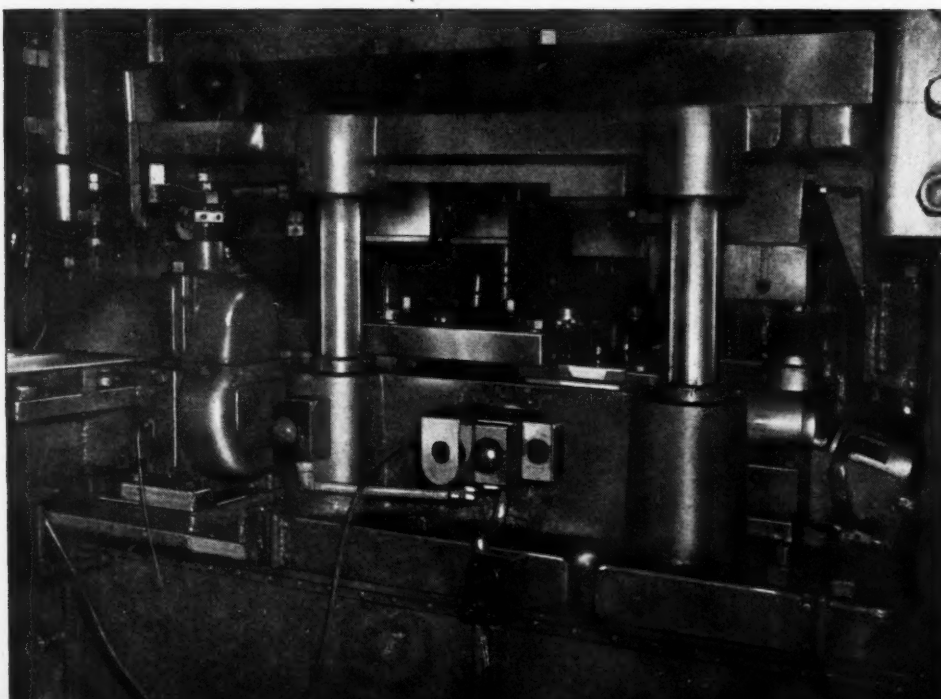


Fig. 5. Close-up View of the Press in Fig. 4, Showing the Arrangement of Automatic Feed for the Strip Stock and of the Successive Dies

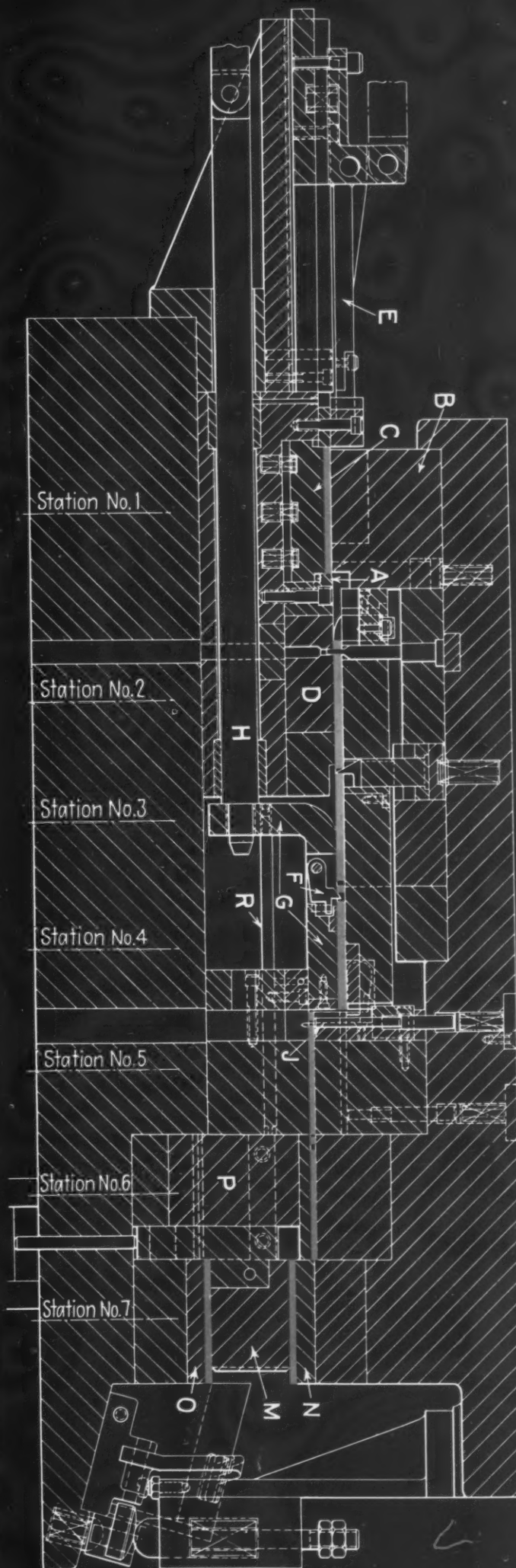
Fig. 6. Diagram Showing Progressive Arrangement of Eight Dies Required in Forming Generator Frames and of Mechanisms Provided for Transferring the Work from Station to Station. Eight Dies Transform Pieces of Flat Strip Stock into Cylindrical Sleeves with Pierced Holes and Stamped Nomenclature

dial. The restruck cup must have an inside diameter of 0.923 to 0.925 inch and an outside diameter of 1.009 to 1.011 inches.

The slide that feeds the disks from the magazine into the first drawing die is actuated directly from the crankshaft by rod *E*, Fig. 2, which is connected at the lower end to crank-arm *F*. On the same shaft as this arm is a second arm *G* which is attached to the front end of the work-feeding slide *H*. The magazine is indicated at *D*. When rod *E* reaches the upper end of its stroke, it actuates a micro-switch through pin *J*. This switch serves as a safety measure. If slide *H* does not return to the "out" position, shaft *E* will not trip the micro-switch through pin *J*. This will automatically shut off the press.

The rotary work-feeding dials are actuated through vertical push-rods at the rear, which are attached to the press ram. When the punches have cleared the rotary indexing dials on each up stroke, these vertical push-rods, by means of cam surfaces, operate slides *K*, Fig. 1, pulling the slides horizontally toward the rear of the press and with them three latches *L*. Lugs or fingers on the front ends of these latches are in engagement with slots in the periphery of the rotary indexing dials *M*; thus the dials are indexed the required amount as slides *K* complete their movement. A spring-backed plunger *N* holds each latch against its respective rotary dial.

When slides *K* reach the rear end of their stroke, locks *O* enter the slots around the periphery of the indexing dials to hold the dials securely in position so that a dial opening and a piece of work will be in direct line with each



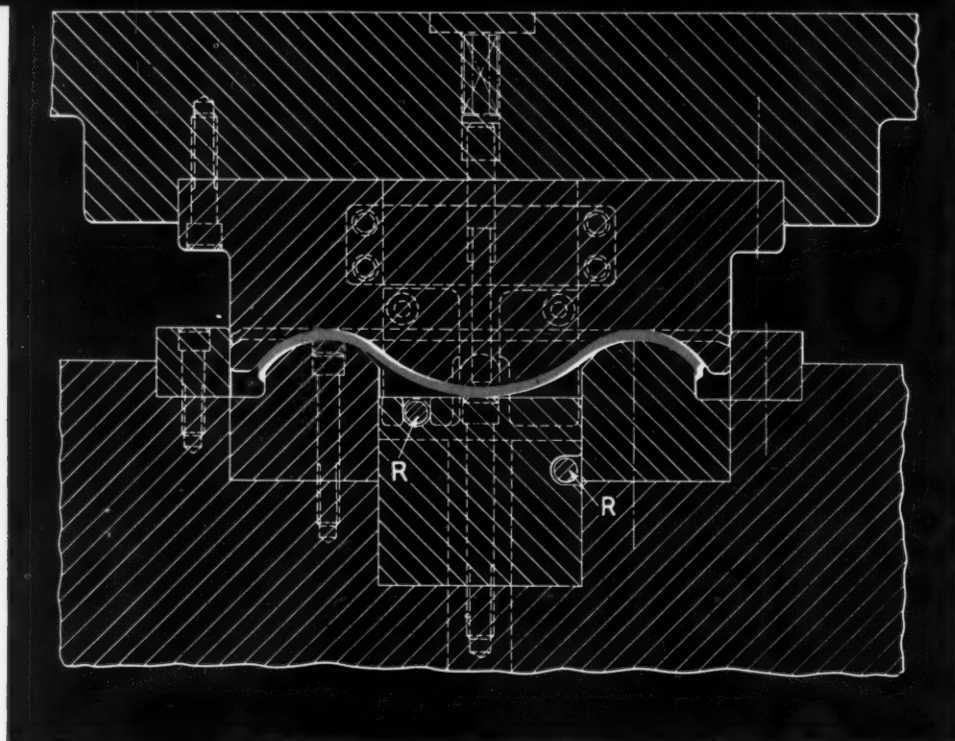


Fig. 7. Die that Performs the First Step in Transforming the Flat Steel Strip into a Cylinder, the Strip here being Shaped into a Triple Curve

descending punch in the second, third, and fourth steps of the operation.

As the ram descends, latches *L* are pushed forward by slides *K* into slots on the dials ahead of those from which they were just withdrawn. This sets the latches ready for the next indexing. Before indexing occurs, and, of course, after the punches have performed their operations, locks *O* are with-

drawn from the dial slots by means of cam surfaces on another set of vertical bars attached to the press ram. The bars for operating both slides *O* and *K* can be clearly seen in the heading illustration.

One of the outstanding operations in the Ypsilanti press shop consists of producing automobile generator frames from steel strip 6.2 inches wide by 0.296 inch thick at the rate of twenty cases a

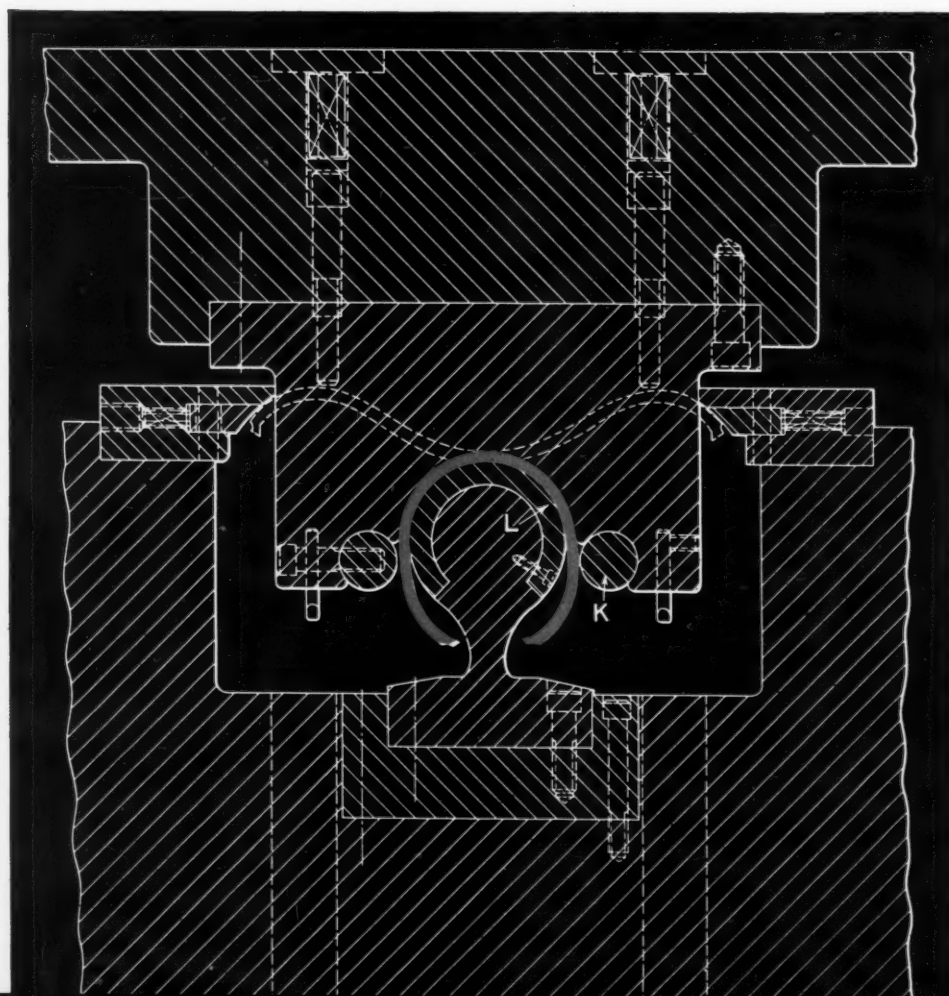


Fig. 8. Punch and Die of Unique Construction Employed for the Second Step in Transforming a Flat Steel Strip into a Part of Cylindrical Shape

TRANSFER MECHANISMS

minute. A Toledo press of 1000 tons rating is used for this operation. When the generator frames leave the press ready for seam-welding, they have an inside diameter of approximately 4.22 inches and are 6.2 inches long. The stock, which comes in 12-foot lengths, is fed into the press on a table lined up on the left-hand side of the machine, as seen in Fig. 4. The stock is carried to the die by the feed-rolls seen at the left in Fig. 5.

Eight separate operations are performed with each stroke of the press. The arrangement of the successive punches and dies is illustrated diagrammatically in Fig. 6. The first step consists of shearing off the strip metal to the required length for a case. Stop *A* lines up the strip accurately for this step of the operation. The stock is sheared as punch *B* is brought down by the press ram into the position illustrated. When the punch ascends, the die pad *C* is raised a short distance to bring the blank on the same level as the top of die *D*. Then a slide *E* at the left of the press, which is operated directly from the crankshaft, advances to push the blank from the cutting-off station to Station 2. Here four slots 5/16 inch wide by 2.46 inches long are pierced through the plate. On the up stroke of the ram, the pierced blank is advanced to the third station by the next blank that is being fed toward the right by slide *E*.

In the third station, both sides of the blank are swaged and a stamp imprints the name of the Ford Motor Co. and the date on the blank. The blank is advanced to the fourth station as slide *E* pushes forward the following blanks. In the fourth station, the legend "B field" is stamped on the work-piece. After the part has been indexed to this sta-

tion, a latch *F* snaps up in back of the blank ready for the next indexing. When the punch in Station 4 has performed its operation, latch *F* pushes the work to Station 5 as bracket *G*, to which the latch is attached, is moved toward the right by rod *H*. This rod receives its movement from the same source as slide *E*.

At Station 5, the work is accurately located by two pins *J* which enter the slots that were pierced in the work by the punch and die in the second station. Then as the punch descends, the blank is

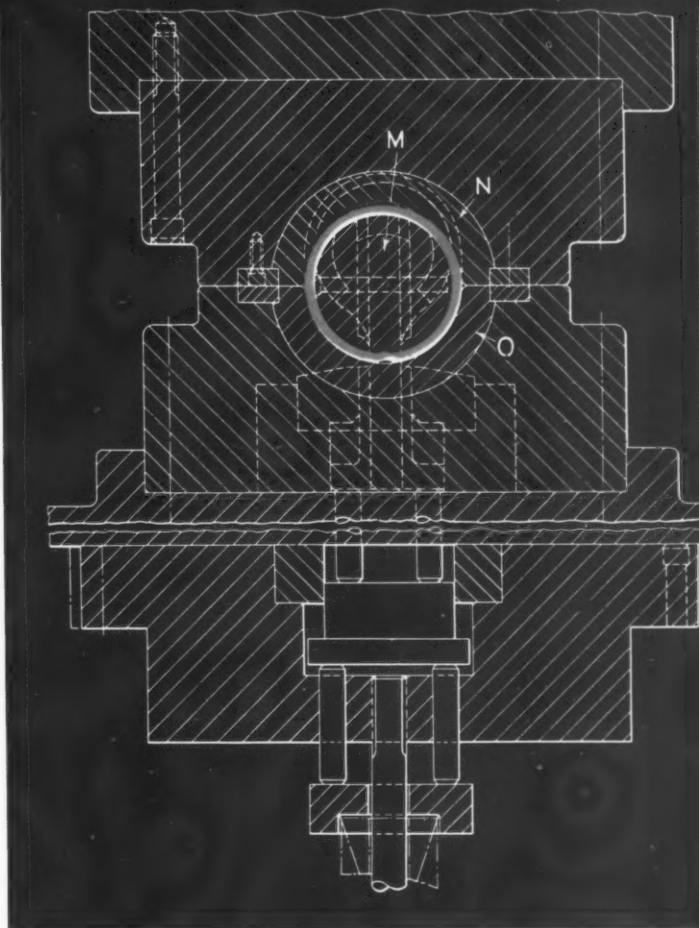


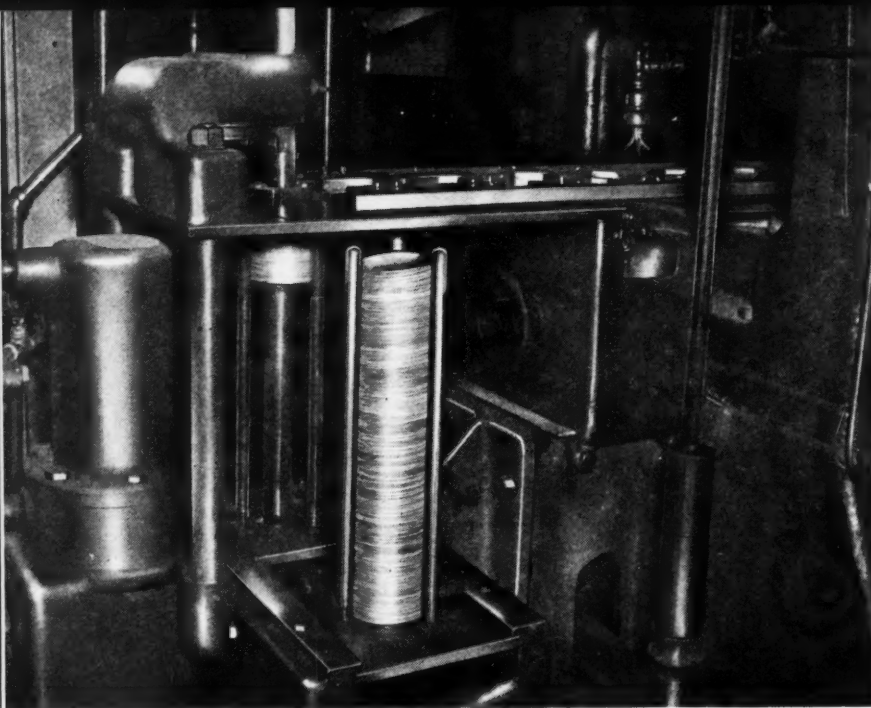
Fig. 9. (Above) Die that Completes Formation of Generator Frames into a Cylindrical Shape. One of the Features of This Die is a Spring-supported Arbor around which Work is Curled as Arbor is Depressed

Fig. 10. (Right) View of Rear of Press in Fig. 4, Showing the Chute down which the Generator Frames Roll to another Chute which Carries Them to Subsequent Welding Operations



Fig. 11. (Left) Loading End of a Press Equipped with Ten Dies in Tandem, to Each of which Work-pieces are Carried by Means of a Slide that Reciprocates through Press and Also Opens up and Closes Side-wise to Effect Work Transfer

Fig. 12. (Below) View of the Ten Punch and Die Sets which Progressively Form Radiator Outlets from Round Brass Disks



formed to the triple curved outline seen in Fig. 7, which shows the punch and die employed for this operation.

The curved piece is pushed to Station 6 by a plate attached to the right-hand end of bracket *G*, Fig. 6, when the press ram moves upward. In the sixth station, the outer curved edges of the work are bent downward to form almost a complete circle. This is done by means of the die set shown in Fig. 8. Features of this die are the readily replaceable inserts *K* and *L* which receive most of the wear that occurs in the operation of this die.

The work is pushed from the sixth to the seventh station by two fingers *R* attached to bracket *G* and contacting the sides of the work-piece in Station 6. In the seventh station, the generator frame is formed into a complete circle, as illustrated in

Fig. 9, being formed around an arbor *M* as the half-round punching member *N* forces the work-piece into the half-round die member *O*. The arbor is pushed downward in this step against the action of a heavy spring that supports the die. This insures true roundness of the work-piece.

When this step is completed and the press ram ascends, the finished generator frame is pushed off arbor *M*, Fig. 6, by block *P*, which is also actuated through rod *H*. Although locating pins have been mentioned only once in this description, suitable means for locating the work are provided in each station of this die equipment.

When the generator frames fall from arbor *M*, they drop on an inclined chute which leads to a conveyor at the back of the machine, as shown in Fig. 10. The frames are not permitted to roll im-

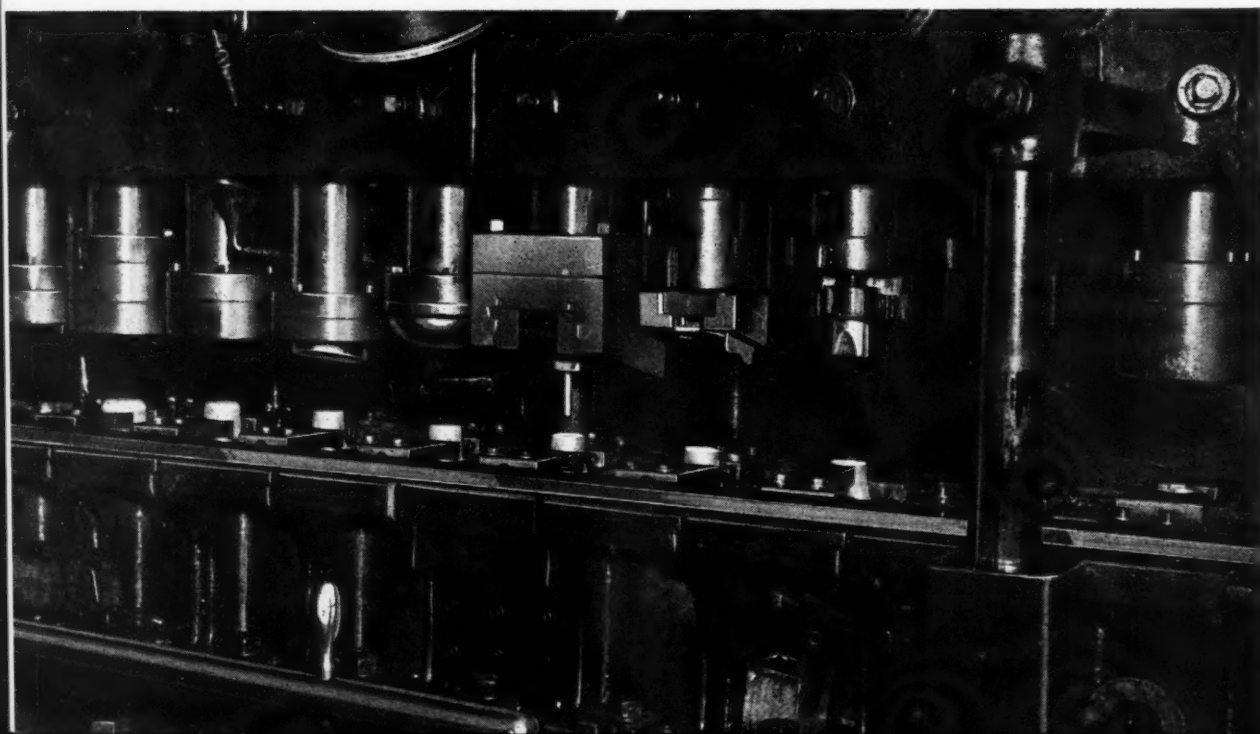
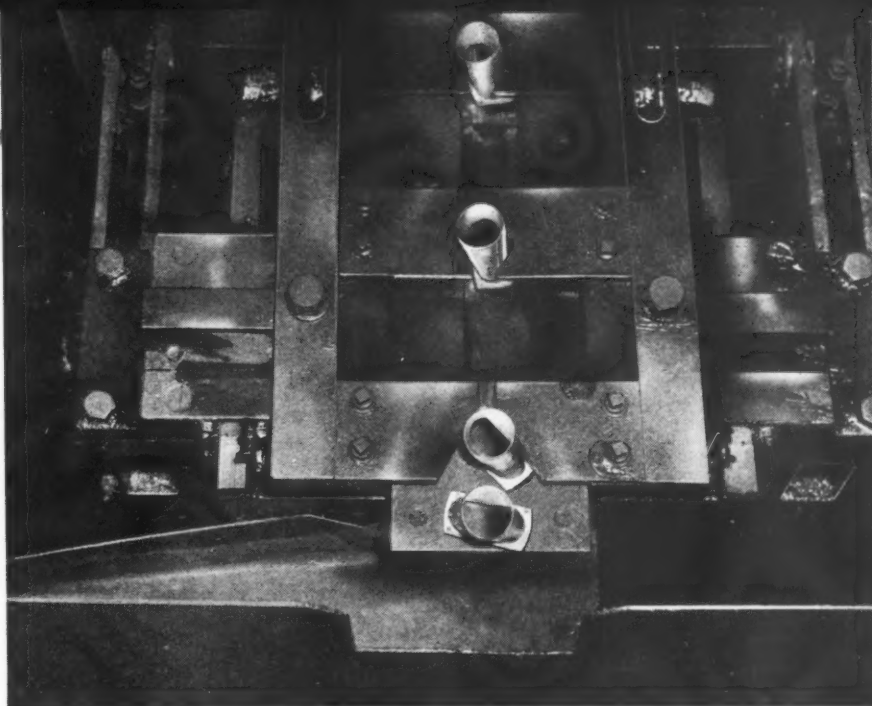


Fig. 13. Discharge End of the Press Used in Producing Radiator Outlets, Showing Finished Outlets about to Drop into a Chute



mediately down the chute, however. After each frame leaves the arbor, it is held back by a hinged stop, which is ordinarily in the raised position seen in the background in Fig. 10. Then when the press ram descends for the next operation, a knock-out pin strikes an arm on the hinged stop and causes it to swing downward sufficiently to release the generator frame. It is then free to roll down the chute to the conveyor.

Multiple-Die Tandem Set-Up in which Ten Operations are Performed on Radiator Outlets

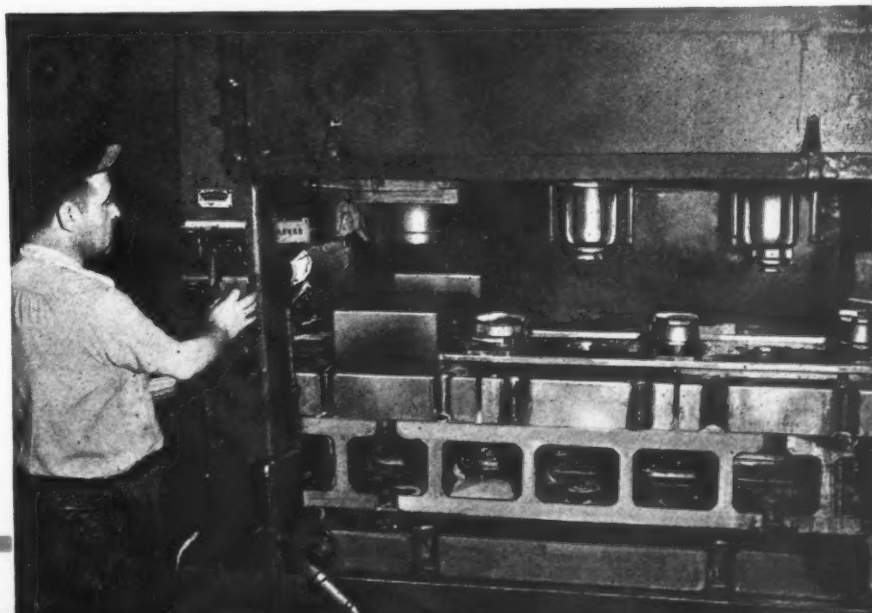
Ten operations are performed on radiator outlets by an automatic hydraulic press through the provision of a novel feeding arrangement for carrying the work-pieces from station to station. This set-up is employed in the Rouge plant. The radiator outlets are produced from brass disks 4.75 inches in diameter, which are stacked at the left-hand end

of the machine, as shown in Fig. 11. In the loading position, a hydraulically actuated ram exerts pressure against the bottom of the stack and periodically raises the stack as disks are lifted from the top. The disks are taken off the stack one at a time by a suction cup on the lower end of a rod that is connected to the left-hand end of the crankshaft. This occurs during each up stroke of the press.

The disk is lifted to the same level as a reciprocating slide which feeds the disks and the work-pieces horizontally through the successive operations. This slide can be clearly seen in Fig. 11. It consists of front and back bars that extend beyond both ends of the press. These bars are provided with steel blocks that are shaped to suit the varying contours of the work-pieces as they progress through the machine. All the punches and dies are spaced the same distance apart, and the work-

(Concluded on page 161)

Fig. 14. Press Provided with Progressive Dies through which the Work-pieces are Pushed, Thus Necessitating Work-transfer Slides Both above and below Dies





Assembling in a Fisher

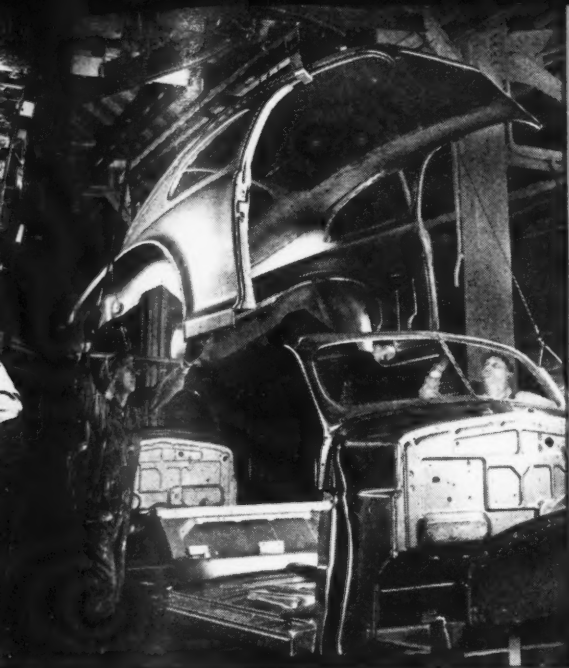
Fig. 1. (Above Right) Volume Production of Automobile Bodies Calls for Assembly-line Precision. A Conveyor Carries These Body Floor Pans through the Welder Shown in the Background and out to Storage

Fig. 2. (Above Left) Flash Welding Insures that Body Parts are Brought together in a Sound Joint. Note Arc Characteristic of This Process

Fig. 3. (Center) Conveyorized Feeder Lines Bring Parts together for Assembly. An Automobile Body Starts to Take Form as the Shroud is Fastened to the Floor Pan

Fig. 4. (Bottom) Accuracy of Stampings is Essential, as Any Deviation in Molded Parts Throws a Strain on Entire Body. Trained Technicians Check Body Parts on a Surface Plate





Operations Body Plant

Fig. 5. (Above Left) The Assembly is Carried by Overhead Conveyors to Meet Shroud and Under Body. Two Men Easily Handle the Operation

Fig. 6. (Above Right) A "Balloon" Fixture Positions the Roof, Quarter Panel, and Rear Sections for Assembly, Thus Permitting the Job to be Done with Ease and Precision



Fig. 7. (Center) A "Unisteel" Body in the Making Requires Plenty of Welding of All Types. An Electric Arc is Used to Join Roof to Shroud

Fig. 8. (Bottom) Every Safety Precaution is Taken to Protect Workers. The "Men from Mars" are Shown Using Disk and Ragwheel Grinders on a "Body in White." The Latter Expression Applies to a Body that is in Construction and before it is Painted



Machining Huge Aluminum Slabs on Scalper of Unusual Design

AT the Alcoa, Tenn., plant of the Aluminum Co. of America heavy scalping machines are used to remove the impurities on the surface of aluminum ingots prior to drawing or rolling. These machines scalp the surface of the slab to a depth of $1/4$ to $3/8$ inch in one pass of the table, thus preventing impurities from being distributed throughout the sheet in later operations.

The scalping machines employed for this work are a horizontal-spindle type (Fig. 1) made by the Ingersoll Milling Machine Co. In appearance and operation, they resemble a vertical-spindle milling machine that has been turned 90 degrees to a horizontal operating position. They will handle slabs weighing from 200 to 10,000 pounds and ranging in size from 2 by 30 by 38 inches to 16 by 63 by 120 inches.

The cutter (Fig. 2), past which the table travels at a feed of approximately 110 inches per minute, is 74 inches in diameter and is driven by a 250-

H.P. motor. Actually, the cutter is an assembly of sixty-eight tungsten-carbide tools, mounted in slots around the periphery of a disk and bolted into place. Each slot is machined with a straight back to assure support for the tool. The rotating speed of the cutter is about 2400 feet per minute, and, being heavy, it provides a flywheel effect during the scalping operation.

The ingot is first positioned on the scalper fixture by four hydraulically operated clamps. After the table has been fed past the cutter, it is returned to the starting position, the clamping arms are released, and the slab is rotated 180 degrees for finishing the reverse side. Handling is simplified by the sectionalized roller table shown at the center of Fig. 1. These sections also are hydraulically operated, and can be raised or lowered by manually operated valves; in addition, either end of each section can be raised or lowered until the roller surface is parallel to the scalper table.

Fig. 1. Horizontal-spindle Scalper Used for Machining Huge Aluminum Ingots at Alcoa Plant

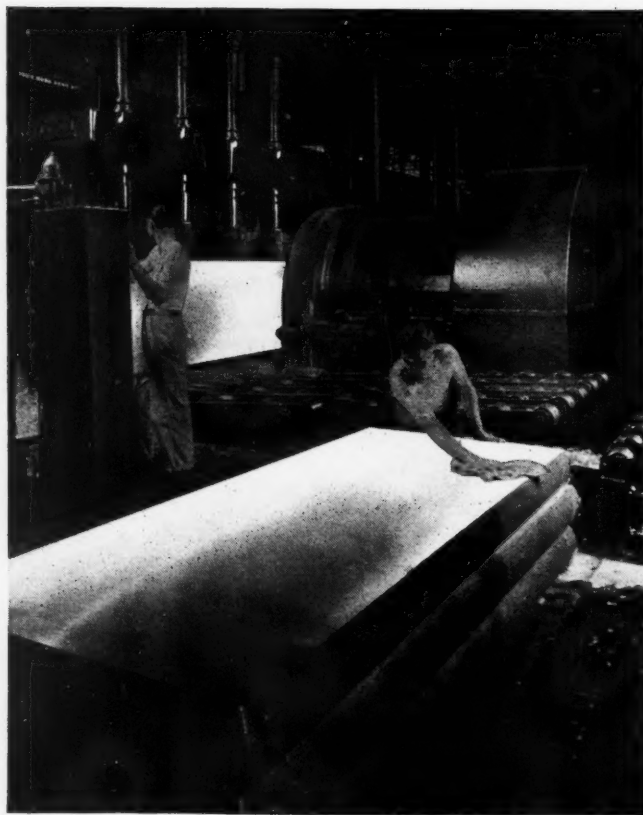
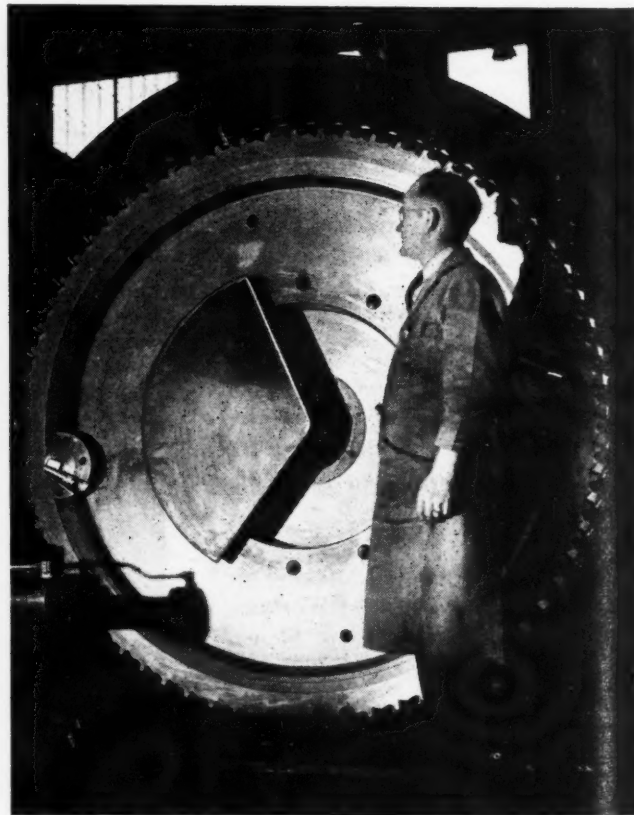


Fig. 2. Tungsten-carbide Tools Mounted around Periphery of Scalper Cutter Disk



Chip-Removal and Coolant-Temperature Regulating System

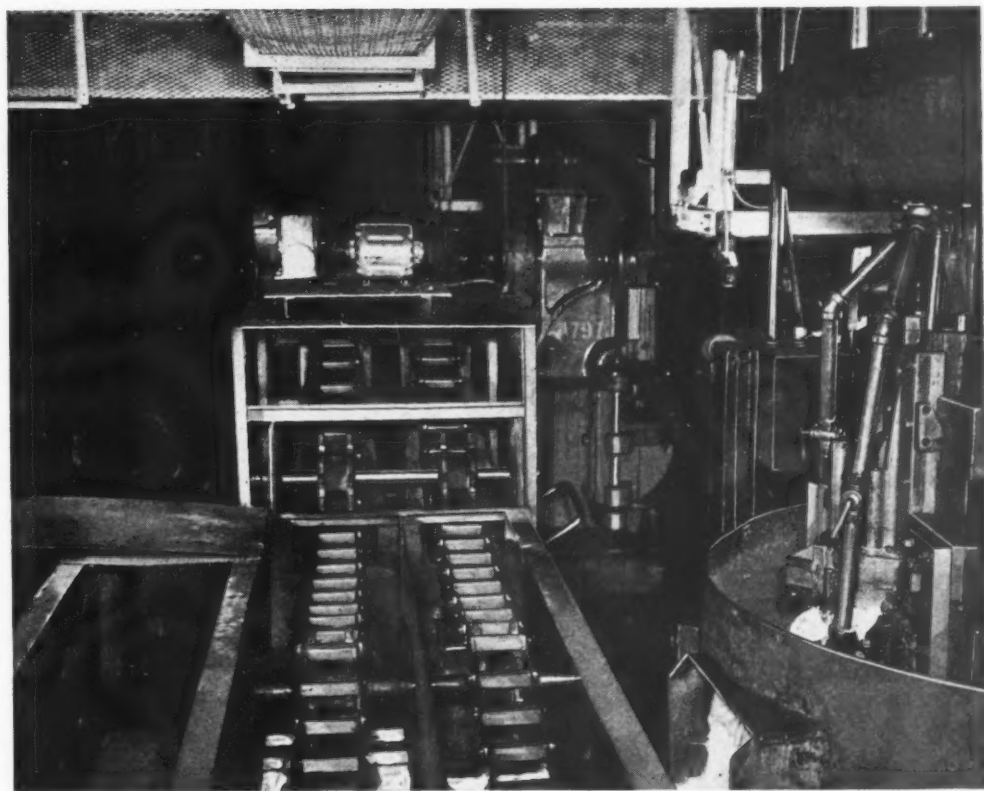
CENTRALIZED collection of chips, regulated coolant temperature, and consequent increased production are advantages derived from an unusual installation recently added to the time- and labor-saving equipment at the Chevrolet Gear & Axle Division of the General Motors Corporation in Detroit. This installation consists of chip-removal conveyors, coolant storage tanks, and a ventilation system, built as a unit and designed to serve groups of three or four machines. The entire unit is mounted on skids to facilitate movement when production sequences call for a rearrangement of machines. Several of these installations are in use and more are contemplated.

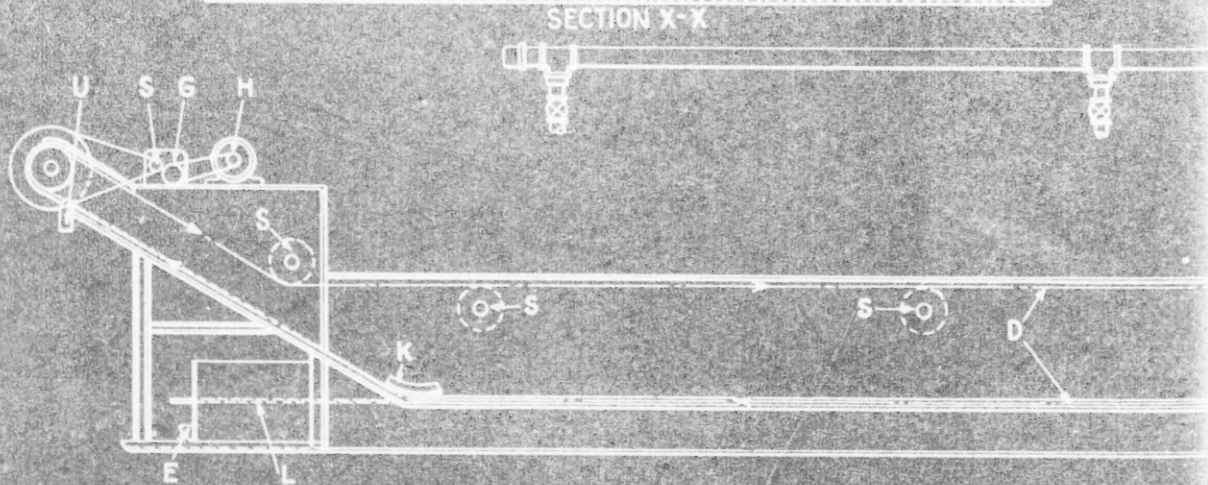
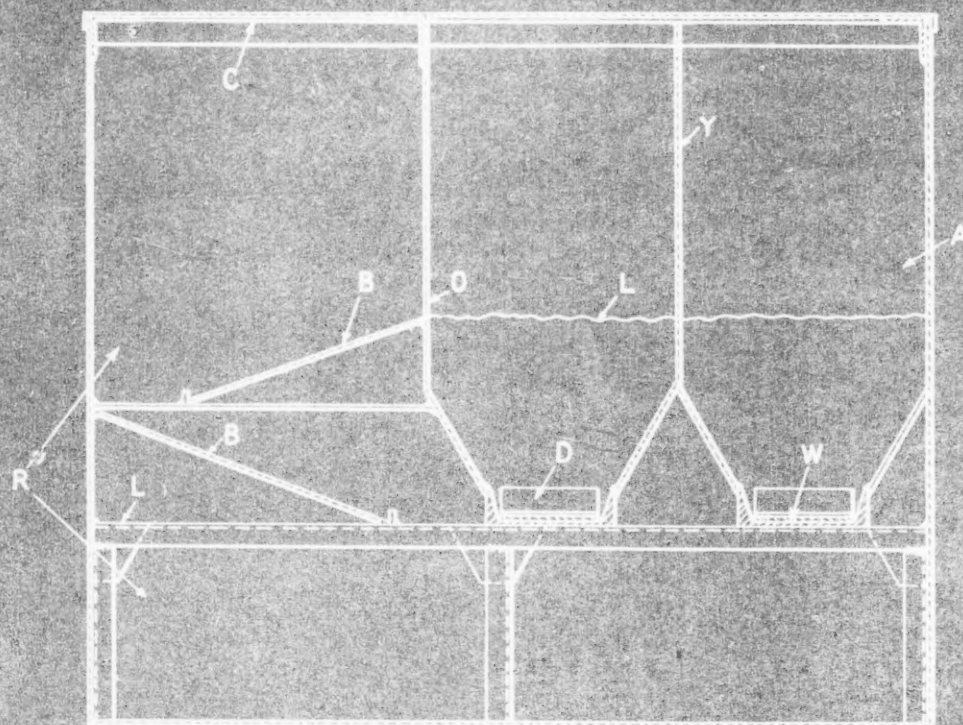
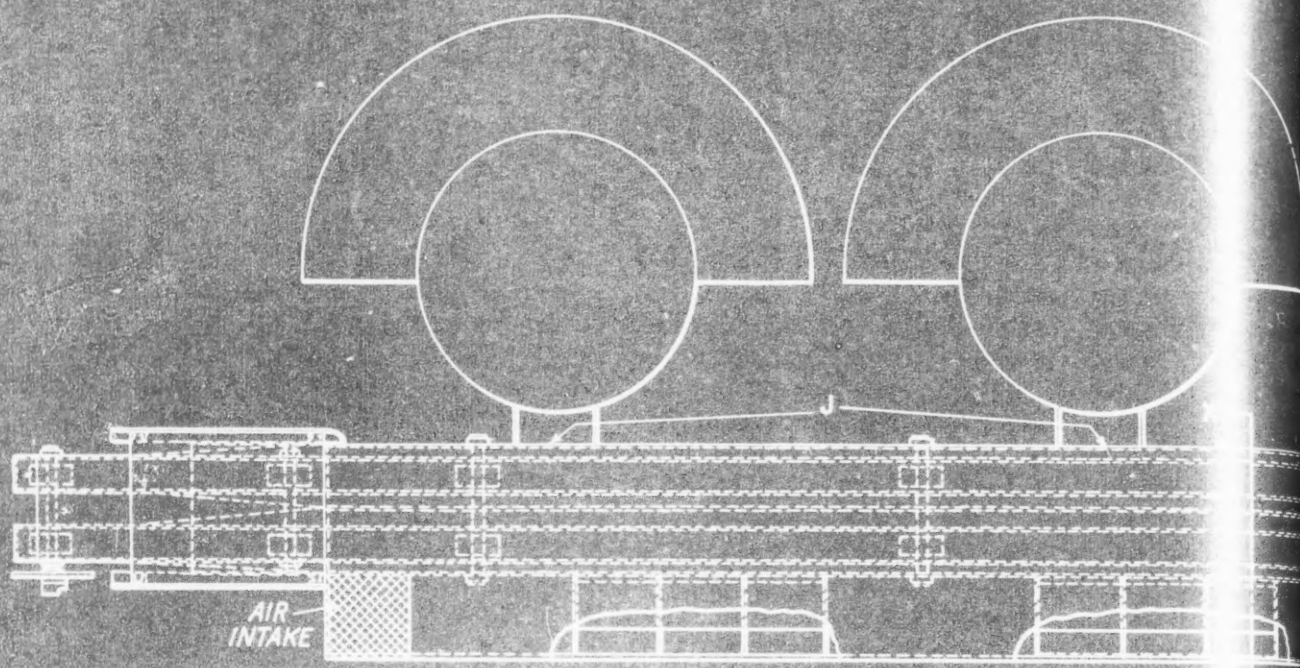
The installation here described serves a group of four Bullard vertical turret lathes, as indicated at the top of the diagrammatic lay-out, Fig. 2. The lathes are used for machining cast-iron automotive brake-drums. This installation is 61 feet 6 inches long, 5 feet wide, and 4 feet 2 inches high, not including the ventilation system. The over-all height at the discharge end is 9 feet 8 inches.

Warm coolant, heavily charged with fine, cast-iron chips, is discharged from the machines through openings *J* into the tank, as shown in Fig. 1. Here, the chips settle in the trough at the bottom of the tank, on wear plate *W*. These wear plates, which are made from 3/8-inch thick hardened steel, extend the full length of each trough. The plates are tack-welded to the channels that form the bottom of the troughs. The coolant flows toward the pump, or right end of the tank, in section *A*, and then back toward the chip-removal end of the tank in the center section of the tank formed by baffle *Y*. This long travel of the coolant permits it to be cooled to approximately room temperature before it is recirculated in the machines, and allows the finer chips to settle out of the solution onto the wear plates. Several small slots are cut in center baffle *Y*, thus permitting part of the coolant to bypass the full circuit, and preventing back-up of coolant in case of an unusually heavy flow from the machines.

The cast-iron chips are scraped from these wear

Fig. 1. Coolant is Discharged from the Bullard Vertical Turret Lathe at Right into a Tank where Drag Chains Remove Cast-iron Chips from Plates at the Bottom of the Tank





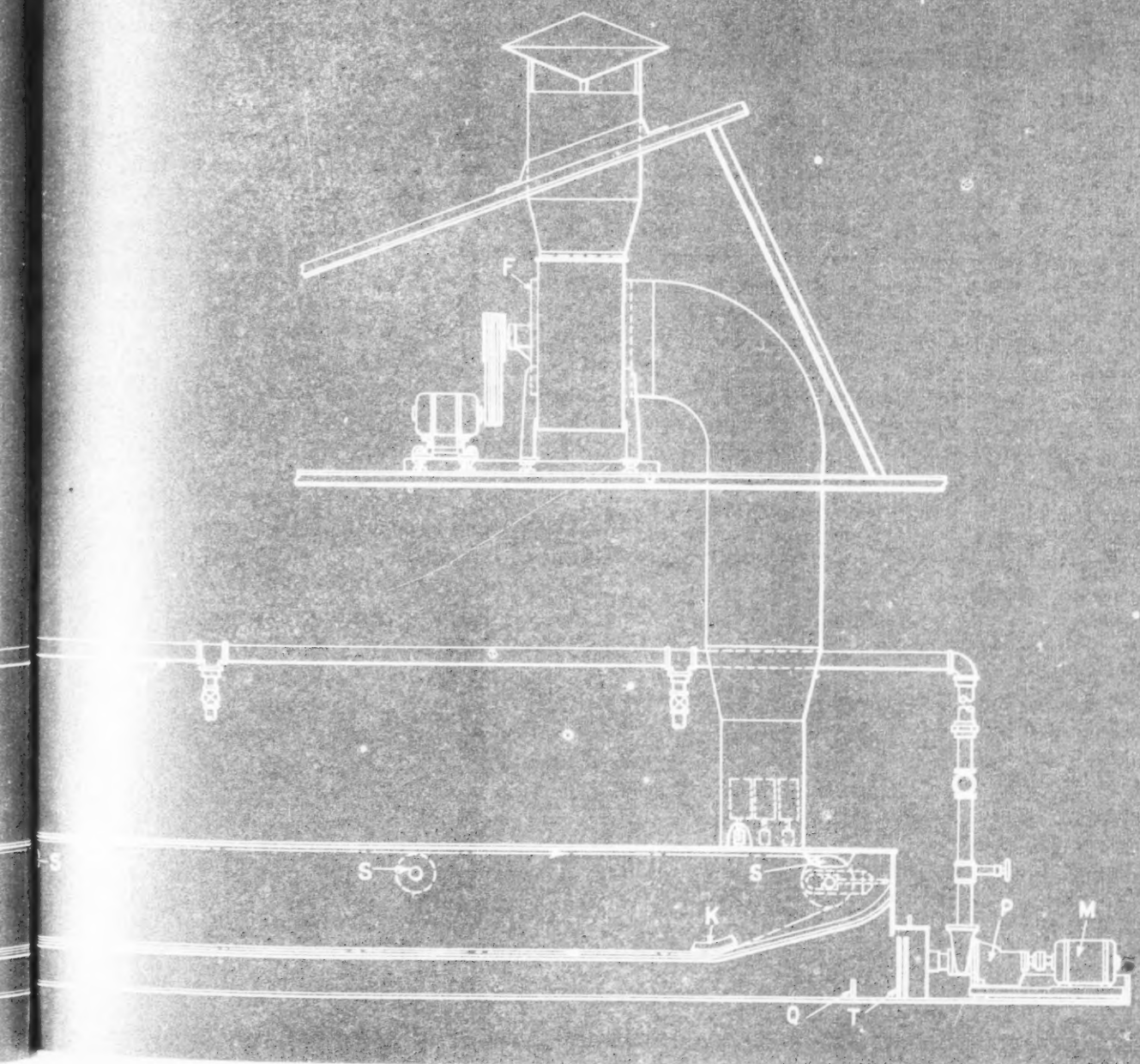
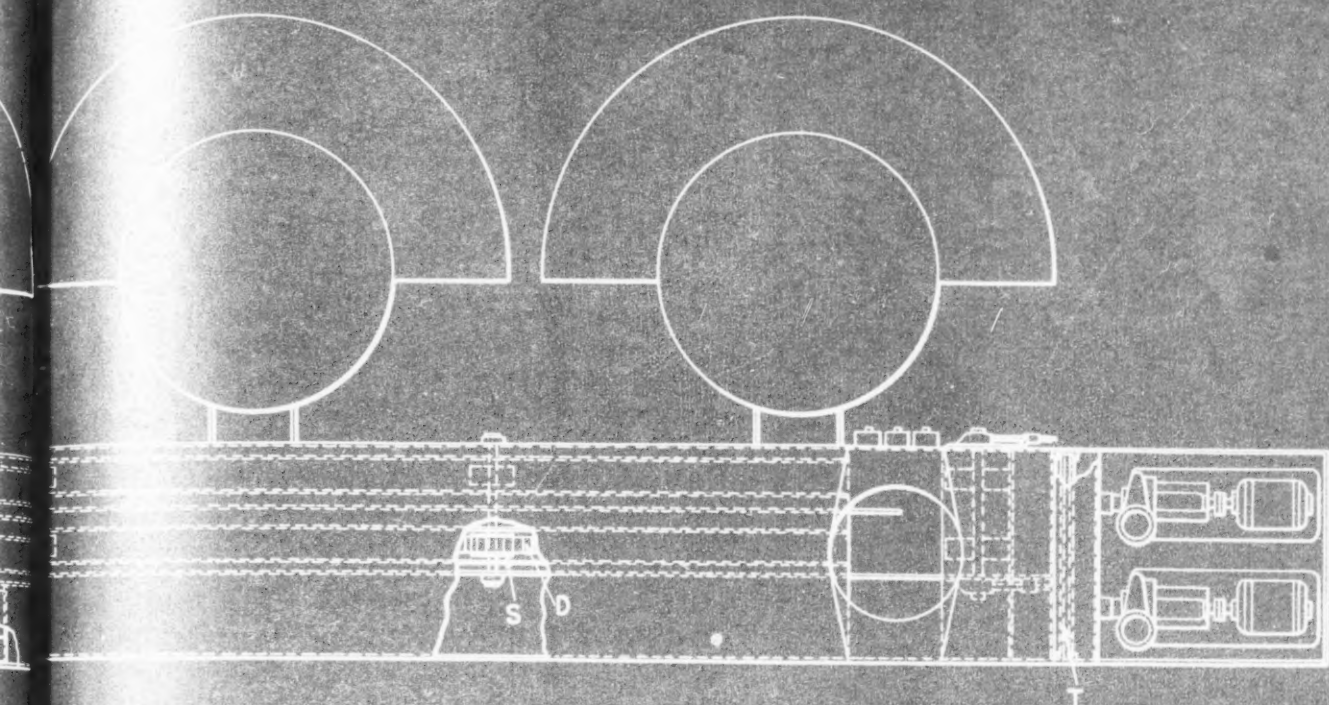


FIG. 1. Battery of Four Vertical Turbine Engines.

CHIP-REMOVAL CONVEYOR UNIT

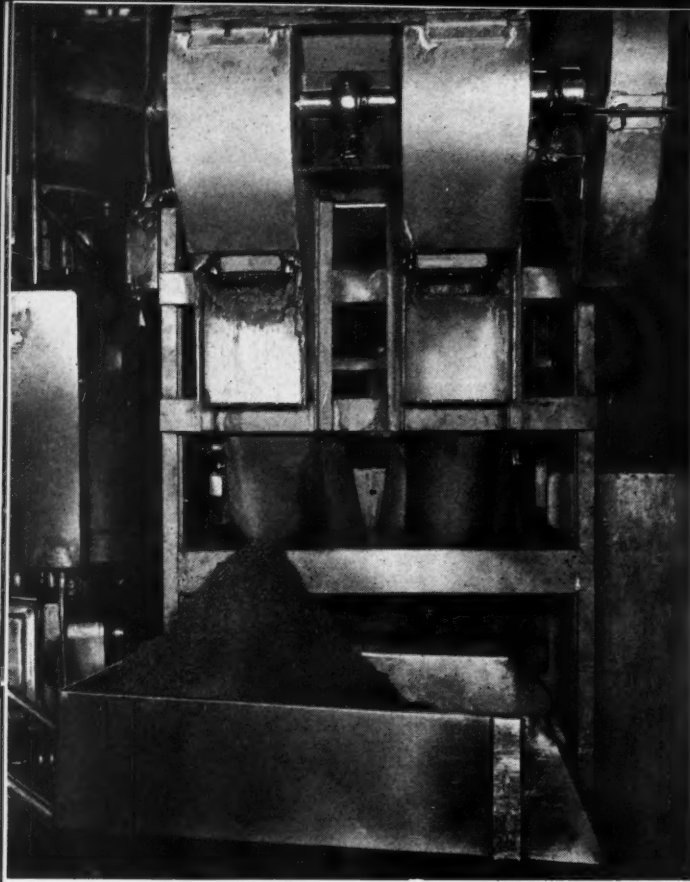


Fig. 3. Chip-removal End of the Installation Shown in Figs. 1 and 2, Showing the Chips Falling from Chutes into a Cart by Means of which They are Carried away

plates by drag chains *D*. Each of the two drag chains is approximately 131 feet long, and has a pitch of 6 inches. They are driven by a 1-H.P. motor *H* through speed reducer *G* and sprockets *S*. The chains move in the direction indicated by the arrows, and the chips are ejected through chutes *U* into a single container, as shown in Fig. 3, or onto another conveyor which takes them directly to a railroad car. Shoes *K*, Fig. 2, constructed from angle-irons, are provided at both ends of the troughs to keep the drag chains in contact with the wear plates. The sprockets at the right-hand end of the troughs are mounted on a frame take-up device for adjusting the tension of the chains. This centralized method of chip collection saves labor and does not interfere with production, as might be the case where it is the practice to clean chips from the individual machines.

When the coolant in section *A* of the tank becomes higher than level *L*, it is discharged through overflow openings *O* onto removable baffles *B*. The coolant flows from these baffles into the base of chamber *R*. Air is drawn through this chamber from the intake shown at the left by the fan *F*, which is driven by a 7 1/2-H.P. motor. This serves to reduce the temperature of the coolant while it is spread to a minimum thickness by the baffles, and to remove any objectionable odors before it is recirculated in the machines. Baffles *B* are periodically removed through cover *C* for cleaning. When it is desired to add fresh coolant to the system, the used coolant may be discharged into the sewer main through the drainpipe *E*. There is also an opening near the top of chamber *R*, which serves to remove any accumulation of light oil and to prevent the tank from overflowing onto the floor.

Recirculation of the coolant is accomplished by either of the pumps *P*, which draw it through one of the screens *T* and lift it to the main header *V*. Only one pump operates at a time; the other one being used as a reserve. A sludge weir *Q*, which stretches across the full width of the chamber, is placed directly in front of screens *T*. The screens consist of two frames, the first holding 16-mesh, 22-gage iron wire cloth, and the second 32-mesh cloth. The two pumps, each of which has a capacity for pumping 400 gallons per minute to a head of 70 feet, are individually driven by 10-H.P. motors *M*. The pumps are provided with stainless-steel shafts and impellers. A quick-operating valve is located on each machine which provides for the rapid control of the coolant flow.

Strengthen the Industry-Ordnance Team in Days of Peace

IN the years intervening between the first and second World Wars, the War Department expended a great deal of time and money in the development of plans for the prompt mobilization of industry in the event of war. This work was carried out under the provisions of the National Defense Act of 1920 in an effort to prevent the nation from ever again drifting into hostilities without adequate provision for prompt mobilization of industry to wartime manufacture. Ten thousand industrial firms accepted definite schedules for the production of specific war items under this program.

While the motives of the National Defense Act were admirable, its provisions were wholly inadequate. When World War II came, its magnitude was so much greater than had ever been conceived possible that it rendered obsolete, even before "M" Day, the extensive work of preparation that had been performed. About the only benefit derived from this preparedness program was a good directory of manufacturers.

Under the exigencies of a country about to go to war, industrial leaders were quickly summoned to Washington to set up war production schedules and to apply their managerial ability in expediting supplies to our armed services and those of our Allies. Victory was due in large measure to the success of their efforts.

General Campbell, who held the post of Army Chief of Ordnance with great ability during the recent conflict, has pointed out that wars are increasingly a problem of immediate and almost total mobilization of national industrial power. Wars are no longer mainly a matter of fighting tactics, but rather a problem in logistics — the branch of military science that treats of moving and supplying armies, as well as conducting campaigns. If there is ever

again an important war, the nation that is strongest industrially and can apply its industrial power quickest and with maximum effectiveness will be the certain winner. It is imperative, therefore, that the industry-ordnance team which functioned so effectively during the war be perpetuated and strengthened.

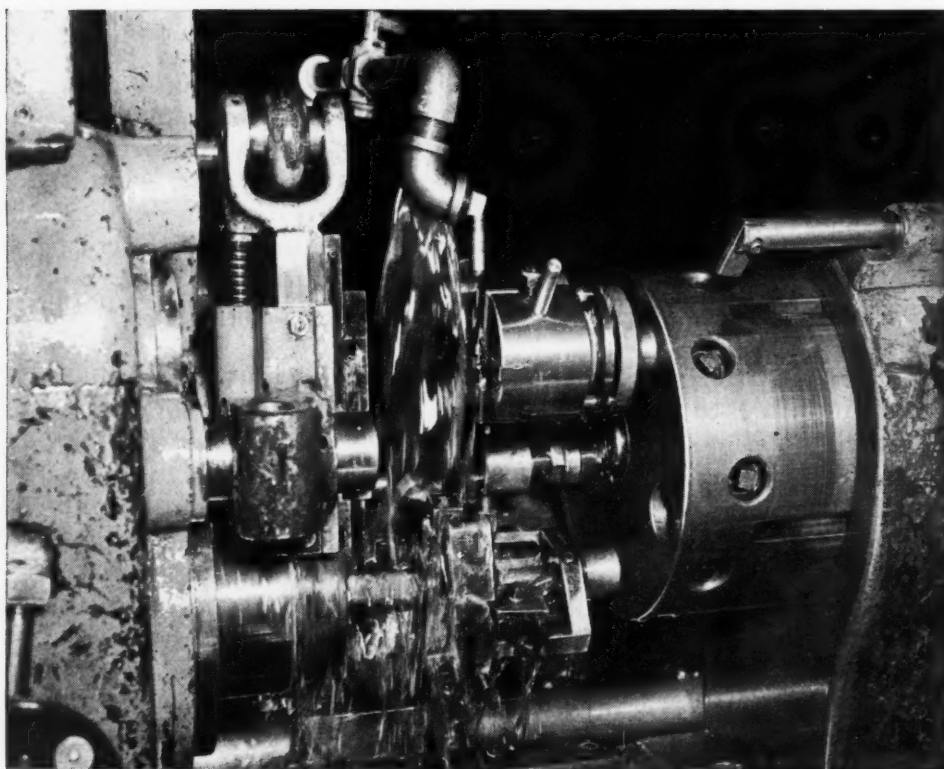
The suggestion has been advanced that a civilian association for preparedness be formed, which might be governed by twenty-five persons selected from basic industries. Such an association could establish panels in the important production centers, on which the individuals would be successful contractors of war items. To these panels could be assigned competent district officers of the Army, Navy, Air Corps, and Maritime Commission to cooperate in the solution of manufacturing problems and to guard against overlapping of contracts with the various services. The panels could go so far as to develop pilot lines for the manufacture of ordnance and prepare plans for the quick expansion of the pilot lines in case of emergency.

Another important function of such an association might be to determine what wartime plants now in existence are necessary for national defense and what surplus machine tools and allied equipment should be put in reserve. There is a crying need for some agency to develop a sound policy on this matter and to convince adamant Government officials of the necessity of an early and sane decision!

Everything possible should be done to further close contacts between our armed services and our industrial leaders in time of peace, because the stronger the industry-ordnance team when no war is in sight, the more effective it will operate in the event that our national security is again at stake.

Charles O. Herb

How Special Blending



Tests Prove Effectiveness of Adding Sulphur, Chlorine, Oiliness Agents, and Other Compounds to Cutting Fluids for Machining Various Steels

By JAMES T. BEARD, Jr.
Staff Engineer
Technical Division, Industrial
Socony-Vacuum Oil Co.
New York City

MODERN cutting fluids are more than blends of straight mineral oils—they are oils to which have been added compounds that improve their cooling ability, lubricity, anti-welding characteristics, and other properties during metal-cutting operations.

The effects of such blending are considered in this article, which is abstracted from a paper presented before the recent semi-annual meeting of the American Society of Mechanical Engineers in Boston. Additives make it possible for cutting fluids to function under heavy loads without developing excessive heat, and result in longer tool life, closer tolerances, and better finishes, even with the higher speeds and heavier feeds now employed. There are several elements and compounds, including sulphur, chlorine, and oiliness agents, that can be added to the base oil. Each of these ingredients acts differently when used on various types of metals or in different machining operations. Consequently, factual data must be used as a guide when choosing a fluid for any cutting process.

Effects of Adding Sulphur to Base Oil

In the early stages of development of sulphurized and allied cutting fluids, too much reliance was placed on chemical analysis. The results were misleading and unreliable because no attempt was

made to differentiate between the inactive natural sulphur present in the mineral oil itself, the active sulphur added in the sulphurizing process, and the less active sulphur present when a sulphurized fat had been incorporated into the blend.

Present information indicates that the machining of clean-cutting steels can be done most efficiently with a fluid containing but little active sulphur and having considerable pressure-resisting characteristics and oiliness. These requirements were met until recently with a blend of straight mineral oil and sulphurized fat. Such an oil gives good results in cutting steels of high Brinell hardness, cold-drawn low-carbon steels, free-cutting manganese steels, and high-sulphur screw stocks.

The reason for this is that active sulphur affects the behavior of the built-up edge on the tool. In machining steels that cut cleanly, there is little accumulation of build-up at the cutting edge of the tool. As a result, the rubbing action of the chip is localized close to the cutting edge. When too much active sulphur is present, this accumulation becomes so mobile that it is rapidly carried away with the chip—an action that leaves the cutting edge unprotected—and the tool breaks down rapidly. The moderately active sulphur in sulphurized fat is sufficient to prevent the build-up from actually becoming welded to the tool, and yet not active enough to leave the cutting edge unprotected.

Improves Cutting Fluids

This is borne out by tests that were conducted while threading S A E 3140 steel, a medium-carbon, nickel-chromium stock of 280 Brinell hardness. At this degree of hardness, the steel is relatively clean cutting, although the pressures are considerably higher than in the unhardened state. So high are the pressures that sulphurized mineral oil surpassed lard oil and mineral lard oil in terms of longer chaser life and better finish, as shown in Table 1. However, a blend of straight mineral oil and sulphurized fat proved even better (Table 2).

On the other hand, hot-rolled low-carbon steels and medium-carbon steels, which can be classified as "draggy," are cut most efficiently when a high percentage of active sulphur is present. Table 3 shows this conclusively. Although the chasers appear to have lasted longer when threading the S A E 1020 stock with a sulphurized fat blend, the finish of the threads was below standard and wear of the chasers was increased.

It is obvious, therefore, that there is an optimum amount of active sulphur for best results in any machining operation. The amount of active sulphur should depend on the cutting qualities of the metal—that is, whether the chips break cleanly from the work or whether they must be torn away. Metal ductility is an indication of cutting quality,

and is a guide to the amount of active sulphur that a cutting fluid should contain. Since the metals that are commonly machined in any shop vary considerably in their cutting qualities, and since the use of a single oil for all operations is usually desirable, the amount of active sulphur must be a compromise. Adjustments of cutting angles, however, will help compensate for deficiencies in the oil.

How Chlorine Affects Cutting Oils

Various reasons have been advanced for the effectiveness of chlorine in machining operations. First, it is said that chlorine provides exceptionally high film strength, and this would seem to be the case when threading Type 303 stainless steel with carbon tetrachloride. Second, chlorine is said to become chemically active at lower temperatures than sulphur; this would seem to be borne out by the effectiveness of chlorine in threading operations, since these are performed at much lower speeds than turning operations. And lastly, it is said that chlorine activates the sulphur in a cutting oil. This may be true, for chlorinated material in straight mineral oil is less effective than active sulphur, and far less effective than active sulphur and chlorine.

Table 1. Effectiveness of Cutting Oils when Threading S A E 3140 Steel (280 Brinell) at 25 Surface Feet per Minute with High-Speed Tangential Chasers

	Lard Oil	Mineral Lard Oil	Sulphurized Mineral Oil
Viscosity, S.S.U. at 100 Degrees F. . .	195	151	156
Sulphur, Total Per Cent	—	—	3.16
Lard Oil, Per Cent	100	40	—
Tool Life, Minutes	2	2	39
Finish	Passable	Passable	Fair
Chaser Wear, In. per Chaser per Min.	0.0282	0.0185	0.0027

Table 2. Effect of Sulphur on Cutting Oils when Threading S A E 3140 Steel (280 Brinell) at 25 Surface Feet per Minute with High-Speed Tangential Chasers

	Straight Mineral Oil Containing High Percentage of Natural Sulphur	Sulphurized Mineral Oil	Blend of Straight Mineral Oil and Sulphurized Fat
Viscosity, S.S.U. at 100 Degrees F. . .	155	156	169
Sulphur, Total Per Cent	2.43	3.16	1.49
Sulphurized Fat, Per Cent	—	—	6
Tool Life, Minutes	54	39	90
Thread Finish	Poor	Fair	Good
Chaser Wear, In. per Chaser per Min.	0.009	0.0013	0.0015

Table 3. Effect of Sulphur on Cutting Oils when Threading Hot-Rolled S A E 1020 Steel at 25 Surface Feet per Minute with High-Speed Tangential Chasers

	Blend of Straight Mineral Oil and Sulphurized Fat	Sulphurized Mineral Oil
Viscosity, S.S.U. at 100 Degrees F. . .	169	156
Sulphur, Total Per Cent	1.49	3.16
Sulphurized Fat, Per Cent	6	—
Tool Life, Minutes	72	55
Thread Finish	Just Passable	Good
Chaser Wear, In. per Chaser per Min.	0.0006	0.0005



Fig. 1. The Cutting Fluid being Used on This High-speed Fellows Gear Shaper is a Sulphurized Oil Containing a New Synthetic Oiliness Agent. Cutter Life is 120 Hours and Cycle Time 2 Minutes on Steel Stock with a Hardness of 10 Rockwell C

However, the addition of available non-toxic materials does not seem to improve the performance of blends of sulphurized mineral oil and sulphurized fat in threading operations. In the threading of "draggy" steels, such as SAE 1020 (120 Brinell), the performance of the cutting fluid actually is impaired; while in the threading of clean-cutting steels, such as SAE 3140, there seems to be no improvement at all (Table 4). On the other hand, adding chlorine to a blend of straight mineral oil and sulphurized fat seems to improve the performance when threading SAE 1020 (120 Brinell) steel as shown in Table 5.

Apparently the effectiveness of chlorine in threading operations is questionable. This lack of effectiveness is further confirmed by the tapping and chasing efficiencies of a blend of sulphurized mineral oil and a special oiliness agent to which chlorine has been added, as indicated by Table 6.

For drilling, on the other hand, chlorine appears to have a distinct advantage. The results obtained with a blend of sulphurized mineral oil and a special oiliness agent, as compared with the same blend to which chlorine has been added, when drilling N.E. 8640 steel are shown in Table 7. Similar results can be expected on cutting-off, reaming, and forming operations.

The oiliness agents that have been most commonly used in cutting fluids comprise lard oil and sperm oil. These materials have no special pressure-resisting properties, and have very little merit in resisting the rubbing action of a chip on the cutting face of a tool. This area of the tool is, indeed, an extreme-pressure area, where the cutting pressures may well exceed 100,000 pounds per square inch. The action of the chip wipes away the oily films. Only the durable sulphide films that

are produced when a sulphurized mineral oil is used can resist this tremendous rubbing action.

Yet the plain oily films do give a considerable measure of protection to the so-called "boundary area" of a tool. This is the area on the clearance face immediately below the cutting edge. It is the area that is most subject to wear during the machining of clean-cutting metals.

Blended with a mineral oil containing the optimum amount of active sulphur, lard oil or sperm oil protects not only the extreme-pressure area of a cutting tool, but also the boundary area. In practice, this protection has not only provided an acceptable finish, but also made it possible for the cutting fluid to maintain the required tolerances of the machined parts. The effectiveness of oiliness agents, however, has been more evident on hard clean-cutting steels than on the softer, "draggier" stocks.

Sulphurized fat has also been used as an oiliness agent. This material has the additional advantage of having exceptional extreme-pressure properties. Blended with sulphurized mineral oil, it has been more effective in machining operations than corresponding blends with lard oil, as shown by the controlled tests in Table 8.

The most effective oiliness agents are those synthetic materials that have been developed within the last two or three years. Blended with sulphurized mineral oil, their performance is practically equal to the performance of the sulphurized fat blends; but their outstanding characteristics are light color and total absence of the objectionable odor of the lard-oil blends or the sulphurized-fat blends.

Soluble cutting fluids comprise what are known as soluble pastes and soluble oils. The pastes con-

Table 4. Effectiveness of Chlorine and Sulphurized Fat on Cutting Oils when Threading Clean-Cutting and "Draggy" Steels at 25 Surface Feet per Minute with High-Speed Tangential Chasers			Sulphurized Mineral Oil	Blend of Sulphurized Mineral Oil and Sulphurized Fat	Blend of Sulphurized Mineral Oil and Sulphurized Fat and Chlorine	
	Viscosity, S.S.U. at 100 Degrees F. . .		156	173	162	
	Sulphur, Total Per Cent		3.16	4.30	2.92	
	Sulphurized Fat, Per Cent		—	6	2	
	Chlorine, Per Cent		—	—	1.23	
	Tool Life, Minutes					
	SAE 1020		55	79	63	
	SAE 3140		39	50	50	
	Finish					
	SAE 1020		Good	Very Good	Good	
	SAE 3140		Fair	Passable	Passable	
	Chaser Wear, In. per Chaser per Min.					
	SAE 1020		0.0005	0.0003	0.0008	
SAE 3140		0.0027	0.0025	0.0028		
Table 5. Effect of Chlorine on Cutting Oil when Threading SAE 1020 and SAE 3140 Steel at 25 Surface Feet per Minute with High-Speed Tangential Chasers			Blend of Straight Mineral Oil and Sulphurized Fat		Blend of Straight Mineral Oil and Sulphurized Fat and Chlorine	
	Viscosity, S.S.U. at 100 Degrees F. . .		169		165	
	Sulphur, Total Per Cent		1.49		0.61	
	Sulphurized Fat, Per Cent		6		2	
	Chlorine, Per Cent		—		1.50	
	Tool Life, Minutes					
	SAE 1020		72		86	
	SAE 3140		90		87	
	Finish					
	SAE 1020		Just Passable		Good	
	SAE 3140		Good		Fair	
	Chaser Wear, In. per Chaser per Min.					
	SAE 1020		0.0006		0.0003	
SAE 3140		0.0015		0.0011		
Table 6. Effect of Chlorine on Tapping and Chasing Efficiencies when Threading SAE 1020 Steel at 25 Surface Feet per Minute with High-Speed Taps and Tangential Chasers			Blend of Sulphurized Mineral Oil and Special Oiliness Agent		Blend of Sulphurized Mineral Oil and Special Oiliness Agent and Chlorine	
	Viscosity, S.S.U. at 100 Degrees F. . .		155		160	
	Sulphur, Total Per Cent		3.0		2.9	
	Chlorine, Per Cent		—		1.2	
	Tapping Efficiency, Per Cent		99		102	
	Threading Efficiency, Per Cent		102		103	
Table 7. Effect of Chlorine on Drilling Efficiency when Drilling N.E. 8640 Steel Plates (265 Brinell) at 75 Surface Feet per Minute with High-Speed Steel Drills			Blend of Sulphurized Mineral Oil and Special Oiliness Agent		Blend of Sulphurized Mineral Oil and Special Oiliness Agent and Chlorine	
	Viscosity, S.S.U. at 100 Degrees F. . .		155		160	
	Sulphur, Total Per Cent		3.0		2.9	
	Chlorine, Per Cent		—		1.2	
	Tool Life, Number of Holes Drilled..		102		141	
	Falex Wear Test, Loss of Weight of Drills in Milligrams		2.3		2.5	
Table 8. Effect of Lard Oil, Sulphurized Fat, and Oiliness Agent on Sulphurized Mineral Oil when Threading SAE 1020 Steel at 25 Surface Feet per Minute with High-Speed Tangential Chasers			Sulphurized Mineral Oil	Blend of Sulphurized Mineral Oil and Lard Oil	Blend of Sulphurized Mineral Oil and Sulphurized Fat	Blend of Sulphurized Mineral Oil and Special Oiliness Agent
	Viscosity, S.S.U. at 100 degrees F.		156	155	173	160
	Sulphur, Total Per Cent....		3.16	2.50	4.30	3.0
	Lard Oil, Per Cent		—	10	—	—
	Sulphurized Fat, Per Cent..		—	—	6	—
	Oiliness Agent, Per Cent...		—	—	—	1.0
	Color, A.S.T.M. Standards ..		4 1/2 max.	4 1/2 max.	Dark Red	4 max.
	Tool Life, Minutes		55	64	79	75
	Finish		Good	Fair	Very Good	Very Good
	Chaser Wear, Inches per					
	Chaser per Minute		0.0005	0.0006	0.0003	0.0004

sist essentially of mixtures of soap, fatty material, and water. Their oiliness properties are sometimes enhanced by incorporating the extreme-pressure properties of sulphurized fat. In service, they are diluted with additional quantities of water. Soluble oils consist essentially of blends of mineral oil and emulsifiers.

Soluble oils have improved to the point where there is a distinct trend toward their use. This trend has been hampered by two things. First, the design of certain machines, particularly automatic screw machines, is such that there frequently is leakage between the cutting-fluid system and the lubrication system. Since the leakage of an emulsion into the lubrication system is definitely objectionable, the use of soluble-oil emulsions in automatics is not approved by many builders. Recognizing the desire to use soluble oils, a few builders have, at the request of their customers, supplied effective seals that make it possible to keep the two systems separate and independent; and it is possible that other builders may eventually follow.

Second, even the heavy-duty soluble oils that are now available are not adequate cutting fluids where a good finish is required on very "draggy" metals, such as hot-rolled SAE 1020 steel, low-carbon nickel steels, and many of the stainless steels. Nor are they adequate cutting fluids in cases where exceptional finish and close tolerances must be maintained, such as in operations on gear shapers, gear generators, gear shavers, and thread millers. Neither have they been found equal to non-soluble cutting oils for thread-grinding and form-grinding.

Recently, other types of soluble compounds have made their appearance. These newer products

comprise water solutions of lubricity materials, rust inhibitors, and germicides. They mix with additional quantities of water more readily than soluble pastes, and just as readily as the available soluble oils.

Too little is known concerning the range of service and the limitations of these newer soluble compounds. Reports from the field indicate that their service is more limited than that of soluble oils. However, they seem to keep the machines and wheels cleaner than the soluble oils and other compounds. Although in some cases, difficulty has been experienced from instability in storage, there is a trend toward the further evaluation of this type of product in the future.

* * *

New International Standards Organization

An international organization for standardization has recently been formed by delegates of twenty-five different nations, meeting in London. The new organization will consolidate the work of the old International Federation of National Standardizing Associations and that of the United Nations Standards Coordinating Committee. The members of the new association will be the national standards bodies. Howard Coonley, chairman of the executive committee of the American Standards Association, has been elected president of the new international organization, and Gustave L. Gerard, staff president of the Belgian Standards Association, will be vice-president. Headquarters will be set up shortly in Geneva, Switzerland.



Fig. 2. Reaming and Finish-forming a Bearing Shell on a Greenlee Automatic. The Transparent, Light, Corrosive Cutting Fluid is a Blend of Synthetic Additives with a Sulphurized Mineral Oil Base

Ingenious Work-Transfer Mechanisms for Progressive Dies

(Continued from page 147)

carrying blocks on the slide are spaced to correspond.

Before the slide moves toward the left to position itself for the simultaneous feeding of work-pieces to all stations of the press, the bars are opened up sidewise to clear all of the work-pieces. That is, the rear bar is moved toward the rear of the machine and the front bar toward the front. Then, the slide is actuated toward the left to the required position, and the front and rear bars are automatically moved toward each other, so as to close on the disks and the partially and fully completed parts. While thus closed, the slide moves toward the right and carries each piece of work and one disk into line with a punch and die. The slide bars move to the left while the ram descends and the various operations are being performed. As the ram ascends the arms close on the work-pieces and the feeding cycle is repeated.

The right and left movements of the slide are derived from a linkage at the right-hand end of the press which is actuated from the crankshaft of the machine. This linkage, as seen in Fig. 13, is connected at the front and rear of the press to a cross-head on which the slide is mounted. The slide bars move back and forth on a guide on this cross-head when they are being closed on the work or opened up. Opening and closing of the bars are effected by links at each end of the press, which are also actuated from the crankshaft.

Between the time that the disks leave the loading end of the press shown in Fig. 11 and reach the discharge end illustrated in Fig. 13, they are worked upon by the punches and dies shown in Fig. 12. In the first station, which is seen at the extreme left in Fig. 12, and in the second and third stations, the part undergoes drawing operations which gradually decrease the diameter and increase the length. In the fourth station, the bottom is formed to an angle. In the fifth station, the closed end of the cup, which is uppermost, is pierced so as to leave this end open, while in the sixth station the bottom is elongated by means of a cam die. In the seventh station, four vertical holes are pierced in the flange and two sides of the work-piece are trimmed. In the eighth station, the flange is trimmed off along the back of the piece, and in the ninth station the flange is similarly trimmed off on the front side. In the tenth station, the top circular edge is beveled. When the pieces leave the press, they are of the shape seen in the immediate foreground in Fig. 13.

In the manufacture of cylinder sleeves, as described in an article published in July *MACHINERY*, several multiple die press operations are employed, in which the work is pushed completely through the dies in the successive drawing and forming steps. One of the press set-ups of the cylinder sleeve production line is illustrated in Fig. 14. A feeding mechanism similar to that used in the operation just described had to be provided both above and below the dies of the press in this illustration.

When the work-pieces have been pushed down through the dies, they are gripped by the bars on the bottom slide and advanced to points where plungers operated from a shaft in the bed of the press push the work-pieces up through the die base and into line with the upper transfer slide. This slide then carries the work-pieces to the successive dies and finally out of the press. A guard that normally encloses the front of the die equipment was removed from the machine at the time that the photograph was taken, so as to give an unobstructed view of the equipment.

* * *

Silicones Make Possible "Weatherproof" Oil

The uses of silicones—that versatile new family of materials developed from a combination of sand, coal, and oil—continue to increase at a fast pace. Westinghouse engineers, for example, found silicone oils highly suitable for the vital job of lubricating aircraft instrument bearings at altitudes where temperatures are sub-zero.

The problem arose during the development of a gun-fire control system for B-29 bombers, which had to work as efficiently at 65 degrees below zero as it would at normal temperatures. Here the lubricant used in the bearings of the delicately balanced gyroscope became a critical item, because if it stiffened at the very low temperatures met in high-altitude flying, the bearing friction would increase and the gyroscope would not operate with the necessary precision.

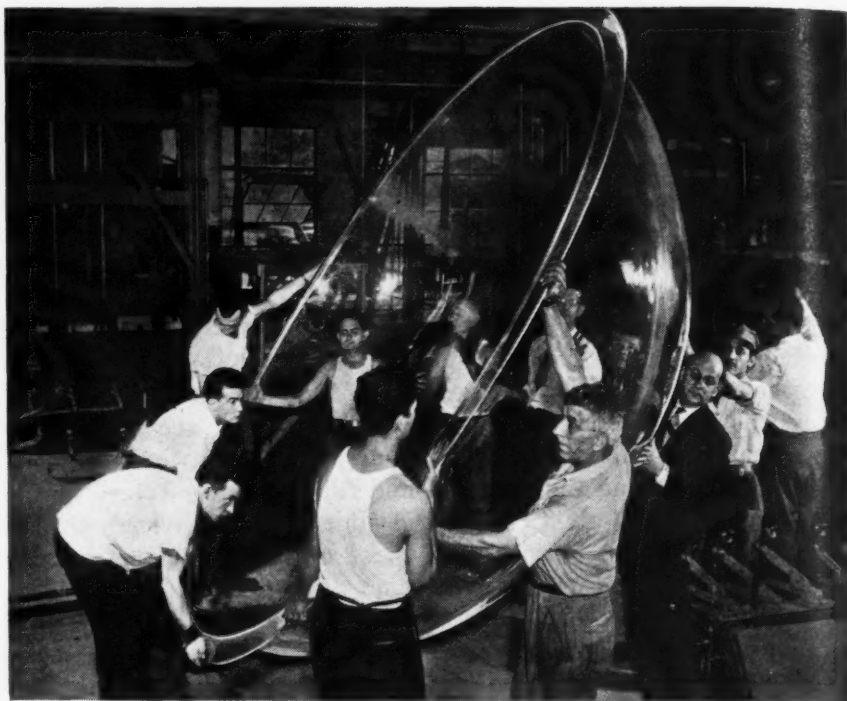
Ordinary oils caused trouble; but it was found by tests conducted in artificial cold chambers that bearings lubricated with silicone oils operated as freely at 76 degrees below zero as they did at normal temperatures. The silicone oils were also found to be just as effective at 212 degrees above zero, thus effectively protecting the bearings against rust and corrosion.

Large Dome Formed from Transparent Plastic Sheets

AFTER four months of experimenting and engineering, a Plexiglas dome weighing more than 300 pounds and measuring about 11 feet in diameter by 4 1/2 feet deep was recently completed by the E. L. Cournand Co., New York City. This dome, shown in the heading illustration, was used in an outdoor advertising display of the Ford Motor Co.

As a single sheet of acrylic plastic, 132 inches square, was not commercially available, it was necessary to join several smaller sheets. This raised the problem of making the bonds strong enough to withstand the vacuum used in forming and the stretching of the sheets due to the forming operation.

Various methods of bonding the sheets together, such as the cementing of butt joints, the use of mating concave and convex grooves, the provision of reinforcing ribs, heat welding, etc., were tried with unsatisfactory results. Finally, concave



grooves were routed in adjoining edges of the sheets, and Plexiglas rods, soaked in cement, were placed in the grooves, as shown in Fig. 1. Pressure was then applied to bring the sheets together, and ultra-violet and infra-red lamps were placed above and below the joints to convert the cement to solid Plexiglas.

A special vacuum pot or tank 12 feet square and 6 feet high was constructed from 1/4-inch steel plates for use in forming the assembled sheet. Instead of building a special oven to heat the sheet to the drawing temperature, the vacuum pot was insulated with a 2-inch layer of rock wool blocks and asbestos and provided with a circular electric heating element around the inner rim and nine electric heating platforms placed radially on the floor, as shown in Fig. 2. The vacuum connection was centered in the tank bottom. Air jets were installed to cool the plastic sheet slowly after forming. A central control panel, as shown in Fig. 3, contains three temperature indicators, a vacuum control and indicator, a cooling air control, and an electrical heating switch.

The periphery of the flat Plexiglas disk was compressed between a steel ring and the rim of the vacuum pot by means of clamps as shown. A heavy plywood cover was placed on top of the sheet to provide increased insulation. The depth of the draw was checked by a ruler inserted in a hole in the center of the plywood cover. The method and equipment for forming were developed by Cournand engineers in conjunction with the technical service staff of Rohm & Haas, manufacturers of Plexiglas.



Fig. 1. Plastic Sheets are Joined by Placing Plexiglas Rods Soaked in Cement in Grooves in the Sheets and Heating and Compressing the Joint

One hour was required for heating the Plexiglas to drawing temperature, forty-five minutes for drawing to shape, and one hour and a quarter for cooling. The cemented joints were buffed and polished to a crystal clarity after cooling.

* * *

Army Air Forces' Reserve of Machine Tools

Following the recent authorization for the Army Air Forces to maintain an initial reserve of 12,500 machine tools, Air Materiel Command Headquarters, Wright Field, Ohio, are formulating plans for the storage of this equipment. This tool reserve will reduce the production load upon the machine tool industry during the critical months of any future national emergency. Such an industrial reserve will also contribute to the immediate expansion of military aircraft production in the event of another emergency. A study initiated at Wright Field in 1944 determined how many of each type of tool would be required to reach a certain production rate within a given period of time.

The present problem concerns the selection of



Fig. 2. A Circular Electric Heating Element is Fastened around Inner Periphery of Vacuum Pot, and Electric Heating Platforms are Placed in Bottom of Pot to Heat Plastic Sheet to Drawing Temperature

the general-purpose tools. Skilled personnel are now examining tools located throughout the country in Government-owned aircraft plants, military depots, and War Assets Corporation warehouses. Only those tools that meet a predetermined standard are being selected for the industrial reserve.

After selection, the tools will be shipped to a strategically located storage space, where they will be prepared for extended storage. Maintenance will be continuous; warehouses will be checked daily, and the tools checked periodically for general condition.

* * *

The competitive scramble to reduce the cost of things so that bigger markets can be won is the force which leads to an increase in the standard of living of the wage-earner and all the rest of us. When a scramble to increase wages is accompanied by a cut in production, it leads to inflation, lower living standards, and a boom that "busts."—Henry Ford II

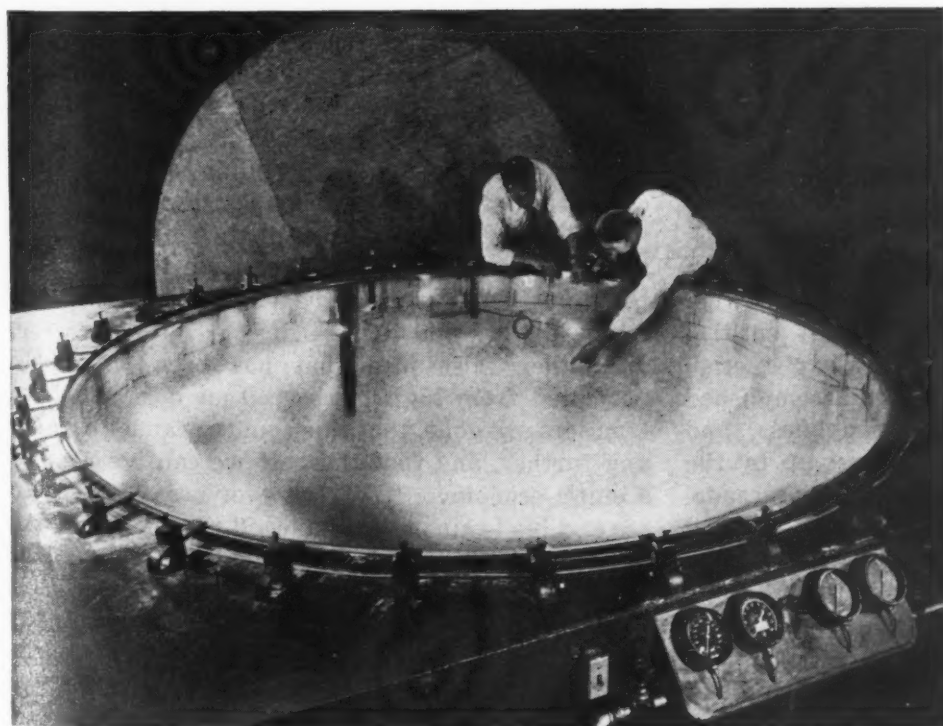


Fig. 3. Plexiglas Sheet Drawn to the Desired Shape. After Slow Cooling, the Dome is Removed and the Joints are Polished and Buffed to Increase their Transparency

Gear Manufacturers Give Attention to Broad Problems of Industry

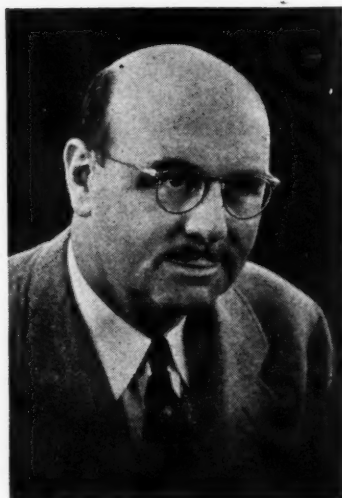
THE semi-annual meeting of the American Gear Manufacturers Association, held at the Edgewater Beach Hotel, Chicago, Ill., October 28 to 30, was attended by an unusually large number of manufacturers and engineers engaged in the gearing industry. In accordance with the general practice of this Association, most of the time during the convention was devoted to meetings of committees handling the technical problems of the industry. In addition, considerable time was given to business and commercial questions, statistics, and cost accounting.

The technical side of the industry was represented by two papers of great interest to the engineers attending the sessions. One of these covered "Jet Propulsion and Gas Turbines in Aviation." In this paper, the author, H. J. Clyman, assistant to manager of engineering, Aviation and Gas Turbine Division, Westinghouse Electric Corporation, drew a clear picture of the present status of jet propulsion in aviation, presenting a rather complicated subject in an unusually simple and easily understood manner.

L. D. Martin, gear engineer of the Eastman Kodak Co., and chairman of the Fine Pitch Gear Committee of the Association, together with L. J. Collins, research engineer of the General Electric Co. and chairman of the Association's Inspection Committee, presented a progress report entitled "Evaluating Surface Roughness of Gear Teeth," in which they reviewed what has been accomplished in regard to measuring surface roughness, and outlined the purpose of a program set up by the Fine Pitch and Inspection Committees for measuring the finish of gear-tooth surfaces.

Discussion of Broad Industrial Questions was Given Prominence on the Program

Important as were the technical questions dealt with during the meeting, great interest was evidenced in addresses that referred to broad national industrial problems. In fact, it was recognized that certain of these problems at present overshadow



Thomas J. Bannan, President of the American Gear Manufacturers Association

some of the engineering problems because, unless they are solved, the opportunity to apply proper engineering in the industrial field will be greatly limited.

The president of the Association, Thomas J. Bannan, president of the Western Gear Works, in his opening address, briefly referred to these national industrial problems. He emphasized the importance of free enterprise and the seriousness of present trends and conditions. He called attention to the forces that are endeavoring to destroy individual initiative and enterprise and to replace them with government controls.

These problems were even more definitely stated by DeWitt Emery, president of the National Small Business Men's Association, Chicago, Ill., who spoke on the subject "What is Ahead for Small Business?"

In the course of his address, Mr. Emery emphasized that one reason for the industrial difficulties in which American industry finds itself today is that altogether too many Americans are firm believers in the basic New Deal philosophy, which may be briefly described as "something for nothing." Absurd as this principle is as a national conception of life, it has been constantly preached to millions of Americans until they have accepted it as a reasonable ideal. They have forgotten the fact that there never can be a successful substitute for hard work and thrift.

Another false idea that has been vigorously promoted from high places is that our industrial frontiers are gone, that this country cannot develop any further, and that the best we can hope for is a static economy. "Yet, whoever uses his eyes to see and his brains to think," said the speaker, "can perceive that instead of our industrial frontiers being gone, they never were more unlimited."

Mr. Emery pointed out that the most prominent present manifestation of the basic New Deal philosophy—something for nothing—is the agitation for "more pay for less work." No nation, even if it did not have a national debt of more than \$250,000,000,000, could long sustain itself on a "more pay for less work" platform. That is what

leads to inflation; but few men in public life have had the courage to denounce this idea clearly and definitely.

Responsibility of Business and Industrial Executives

"American business men and manufacturers must themselves assume a great deal of the responsibility for the fallacies accepted by their employees," said the speaker. "They have not done their part in informing their workers as to the true facts of business and industry. The relation between wages and dividends, for example, has never been explained to more than a small fraction of our workers, from the industry point of view. The average worker knows very little about how small, proportionately, is the part that goes to dividends as compared to that which goes to wages, cost of materials, taxes, and other expenses. If he knew, he would feel a great deal better about his share of the proceeds, and such information would help to create a far better spirit of cooperation between him and his employer.

"Furthermore, how many employers have taken the trouble to inform their workers how much of an investment it takes in buildings and machinery to employ just one man or woman? The national average is more than \$6000 of capital invested in buildings and machinery in order to employ one worker. Someone has had to save that money, and use it for the purpose of creating a job for someone else."

Five Things that Industry Must Not Ignore

Mr. Emery listed five important things that must be done to place American industry in a position where employment and income may be reasonably assured to all able and willing to work.

1. Business must do a better job in explaining its part in the creation and maintenance of the American standard of living. It must make clear to the American people the importance of freedom of enterprise.

2. We need a sound fiscal policy for our Federal Government, in the hands of honest and competent administrators. To obtain this, we need to inform the public of the importance, to their own well-being, of an honest and competent Administration.

3. We must get rid of governmental controls, restrictions, and regulations, especially the OPA, the Civilian Production Administration, and the Wage Stabilization Board. Price control is impractical and unenforceable and a hindrance to normal, healthy business, as well as a breeder of black markets and a creator of lawbreakers.

4. We need emancipation of workers from the shackles of repressive laws, and of interference

with the personal freedom of free Americans. The right to work is just as sacred and fundamental as the right to life, liberty, and the pursuit of happiness. Every man in America should have returned to him his constitutional right to work when and where and for whom he chooses, without being forced by his Government or by any group or individual to pay tribute to a private organization for the privilege to earn a living for himself and his family. *The right to refuse to belong to an organization should be recognized as just as fundamental as the right to organize.*

5. Industry must realize the importance of the American principle of free enterprise by removing from the public payroll every communist and communist sympathizer now employed by any branch, bureau, department, or agency of our Government. Most business and industrial men have no idea of the extent to which communists have infiltrated into positions of trust and responsibility in our Government. "If anyone doubts this statement," said the speaker, "let him read page 521, of Volume I, of the War Department Education Manual, EM 763, 'Economics, Principles and Problems,' published in two volumes."

In conclusion, the speaker quoted his definition of the American way of life, ending by saying that we have for the last 150 years devoted ourselves to obtaining the highest standard of living the world has ever known. We have achieved this result because for more than 150 years free men in a free country have been working together to provide this better way of life.

* * *

Surface Finish of Steel in Face Milling

In a paper recently presented before the fall meeting of the American Society of Mechanical Engineers in Boston, A. O. Schmidt, research engineer of the Kearney & Trecker Corporation, Milwaukee, Wis., discussed the surface finish of steel in face milling.

From several thousand profilometer readings of surface finish gathered in face milling tests made with cutters having a variety of radial rake angles over a period of three years, it was concluded that surface finish in face milling is determined more by the cutting speed and feed per tooth than by the radial rake angle.

With the same cutting speed and feed, it was found that the surface finish, as measured by the profilometer, was approximately the same for both negative and positive radial rake angles. Also, the higher the cutting speed and the finer the feed, the better the surface finish. However, at too fine a feed and too high a cutting speed, the milling cutter will wear rapidly.

High-Speed Assembly of Radiators by Induction Soldering

INCREASED production requirements for soft soldering of radiator assemblies at the tractor works of the International Harvester Co. necessitated either additional floor space or a more efficient method of soldering. As additional floor space was not available, a 20-kilowatt, 9600-cycle induction heating unit manufactured by the Ohio Crankshaft Co., together with a six-station work unit, was installed.

This induction method has increased the production rate 280 per cent. An operator hand-soldering the assemblies could produce only 10 per hour. Now, with high-frequency heating, one operator produces 28 per hour. Automatic heating eliminated many troubles and reduced rejections and field complaints. Also, substantial reductions in unit costs have been realized.

Induction heating has permitted the use of a prefabricated solder ring containing the exact amount of solder necessary for a perfect joint. No solder is wasted and the joint is always uniform.



Fig. 1. (Above) One of the Radiator Soldering Stations of the Equipment Shown in Fig. 2
Fig. 2. (Below) Six-station Work Unit for Induction Soldering of Three Types of Radiators

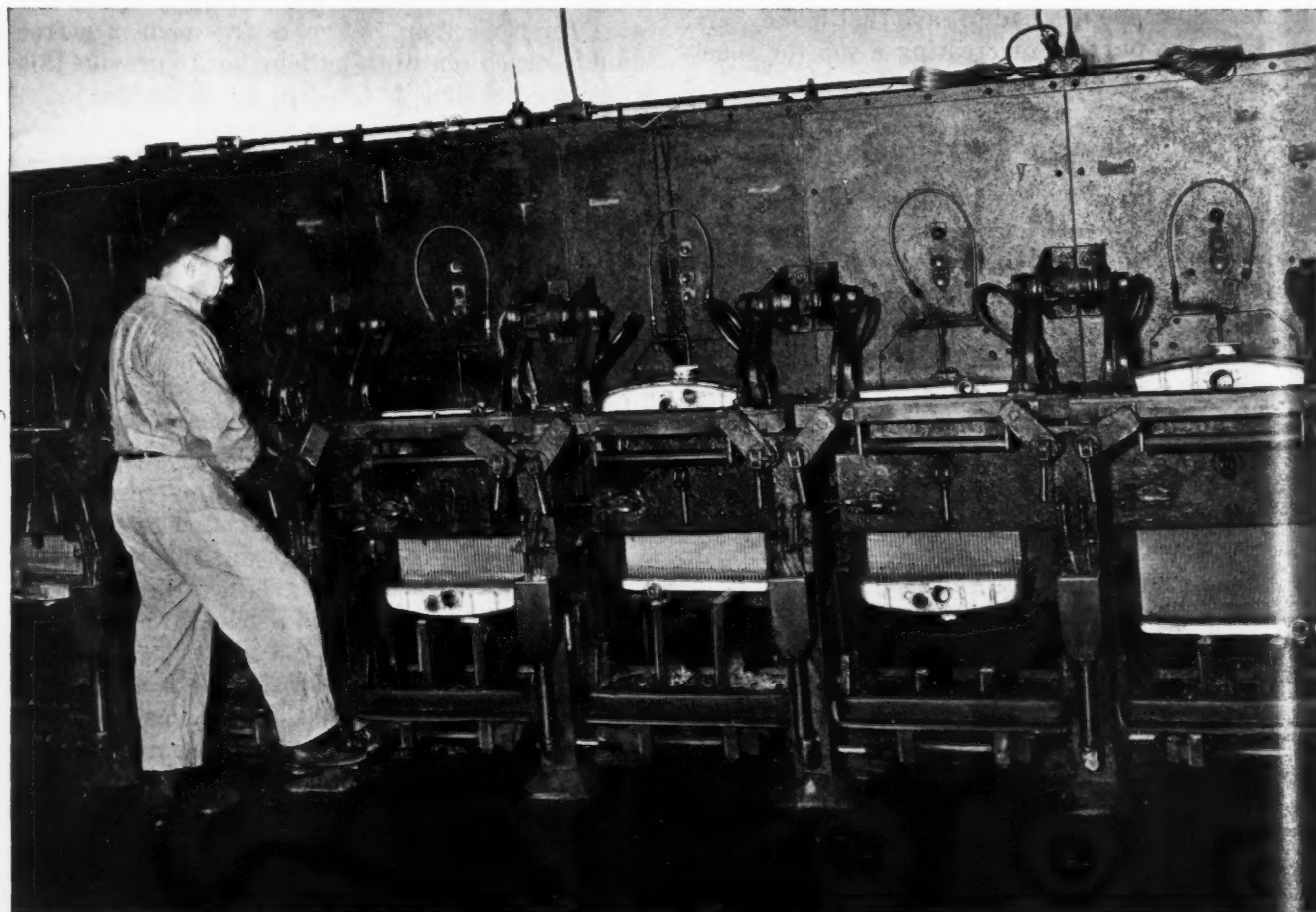
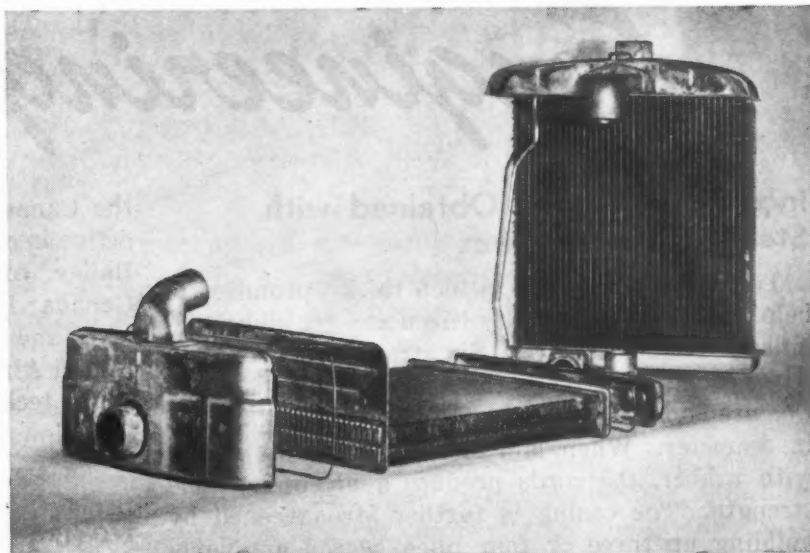


Fig. 3. Disassembled and Assembled Views of a Radiator that is Automatically Soldered by Means of the Induction Heating Unit and Set-up Shown in Figs. 1 and 2



This has improved the quality of the finished radiator, and resulted in an annual saving of \$7000 in solder costs alone.

Disassembled and assembled views of the radiator are shown in Fig. 3. From left to right in the disassembled view, the parts are a top tank unit; prefabricated solder ring; radiator core assembly; another solder ring; and a bottom tank assembly.

The six-station unit shown in Fig. 2 is set up for soldering three types of radiators. One station is used to solder the top tank assembly, and the adja-

cent station handles the bottom tank assembly of the same radiator. The operator places a preformed solder ring on the top tank unit, fluxes the joint, inserts the radiator in the fixture, and pulls down the hinged, split type inductor coil, as shown in Fig. 1. The control button is then depressed and the heating cycle is automatically timed. At the completion of the heating cycle, which requires about thirty seconds, the radiator is removed, inverted, placed in the adjacent station, and the procedure is repeated on the bottom tank assembly.

Color Improves Working Conditions in a Railroad Shop

IMPROVED working conditions were obtained in the Diesel Repair Shop of the Burlington Lines, West Burlington, Iowa, by painting the machinery, equipment, and building interior in distinctive colors. The color scheme employed was selected with a view to reducing eye strain, improving safety, encouraging cleanliness, and increasing production.

Critical or operating parts of the machines were painted buff, because this color focuses the operator's eyes where they should be, and it provides a clear-cut contrast with the material being worked on and the stationary parts of the machine. Green was used for the non-critical or stationary parts of the machines, as this color gives parts the appearance of receding or being drawn back, and has a relaxing effect on the human eye. Red was employed on the exterior of machinery guards and shields over gears. The inside of these guards, the ends of shafts or moving parts to be guarded, the sides of gears, and the blocks and hooks of cranes were painted yellow.

The walls and ceiling of the shop were painted blue to give an appearance of lightness and to make the ceiling less apparent. This gives the effect of

more space and air. Orange traffic stripes 4 inches wide were provided to separate the various departments from the areas used for transportation and storage of materials. Electrical switches, control panels, mobile equipment, and fire equipment were painted orange to make them more prominent.

* * *

Air-Cooled Diesel Engine for Small Power-Driven Equipment

Because of the high compression ratio necessary to insure combustion, and the consequent high temperatures developed, most Diesel engines are water-cooled, particularly those designed as stationary power plants. However, a new air-cooled, 3 3/4-H.P., four-cycle engine has been developed by the R. H. Sheppard Co. using a modified airplane type of cooling fin, together with a forced-draft air stream. The piston speed is 1200 feet per minute; the fuel consumption, 1/2 pound per B.H.P. hour. The engine was designed to drive auxiliary lighting plants, pumps, and other power-driven equipment.

Engineering News

Increased Mileage Obtained with Steel-Reinforced Tires

Tiny steel wire—0.0059 inch thick—promises to help American heavy-duty tire users get additional mileage from their tires. Six strands of three steel wires each, produced by the American Steel & Wire Co., are laid around a core to form a cord 1/32 inch in diameter. When laid side by side and coated with rubber, the cords produce a ply of extreme strength. The casing is further strengthened by building up three or four plies, placed angularly relative to one another, to make the foundation for the tread rubber. Due to the wrenching and bending to which the cords are subjected, the wire used in their construction must be made of extremely high grade steel with a tensile strength of 325,000 to 400,000 pounds per square inch. Heavy-duty tires made in this way were used extensively during the war.

The new product is also suitable for use as reinforcement for power transmission and conveyor belts, where strength and endurance must be combined with a high degree of flexibility.

Excess Oxygen Supplied to Open-Hearth Furnaces Increases Production

The possibility of substantially increasing steel production by the use of present facilities, through the application of additional oxygen in open-hearth furnaces, is indicated by the results obtained from large-scale tests conducted at the plant of the Steel Co. of Canada at Hamilton, Ont. The tests, which were witnessed by operating executives of many American steel companies, were conducted in a 150-ton furnace. Oxygen was introduced into this furnace by a newly developed method so as to produce a controlled flame which was directed at the furnace charge during the melt-down period. No apparent effect on the furnace lining resulted from this procedure.

Tests have proved that the scrap melting time can be substantially reduced in this manner. There seems little doubt that the production from present open-hearth furnaces can be stepped up appreciably with no expenditure for additional equipment. However, many plants, in order to take full advantage of this new development, may have to make same alterations to speed up their scrap handling facilities. The new development was first put into use by the Steel Co. of Canada in conjunction with

the Canadian Liquid Air Co., Ltd. Among those active in conducting the test program were E. T. W. Bailey, combustion engineer of the Steel Co. of Canada; Frank G. Kerry, manager of the development and engineering department of the Canadian Liquid Air Co., Ltd.; and G. V. Slottman, manager of the technical sales division of the Air Reduction Co., New York City.

Device for High-Frequency Welding of Magnesium Eliminates "Arc Blow"

When the White Aircraft Corporation, Palmer, Mass., began arc-welding magnesium aircraft parts by the high-frequency argon method, jumping of the arc to either side of the weld frequently caused burned spots in the metal which resulted in rejected assemblies. Ionization of the argon gas, and the resultant increase in conductivity, made it possible for the high-frequency arc to jump for distances up to 1 1/4 inches. This tendency was particularly troublesome when stopping or starting the welding operation.

To eliminate this condition, a magnetic switch, capable of carrying the rated load of the primary circuit of the welding transformer, was installed between the regular disconnect switch and the primary of the welding transformer, and the holding coil was connected to a foot-switch within easy reach of the operator. The high-frequency attachment was then permanently connected to the same switch, so that when the foot-switch is operated, the magnetic switch energizes both the low-voltage welding current and the high-frequency current used to start the arc.

With this arrangement, the welder places the electrode on the work, starts the current with the foot-switch, and then merely lifts the electrode to start the arc. At the end of a weld, release of the foot-switch instantly stops the arc before removal of the electrode. Thus complete control of the arc is obtained, and rejected parts resulting from "arc blow," as well as danger to the welder, are eliminated.

Use of the magnetic switch also enables the operator to rest the electrode at the exact point at which the weld should start, get the weld rod ready, and then drop his face shield before depressing the foot-switch. Accurate welding is thus simplified, and the need for strong lights to enable the operator to see where the arc must be struck is eliminated.

Designing Parts for Powdered-Metal Production

By IRVING J. DONAHUE
Presmet Corporation, Worcester, Mass.

Pointers for Increasing Output and Decreasing Scrap Loss of Pressed-Metal Parts—Abstract of a Paper Presented at the Fall Meeting of the American Society of Mechanical Engineers

BECAUSE of its many advantages for small, lightly loaded parts, powder metallurgy has been increasing the scope and number of its applications in the last few years. But, as with other processes, parts must be designed specifically for this method of production if the application is to be a success, and the tools must be designed so that the finished part will have the required shape and density and will be ejected from the die without being ruptured.

For example, limits of concentricity must be reasonable. This is necessary because the part, in most cases, is formed with tools that have radial fits within each other, and clearance must be provided so that the part will not bind or score due to expansion caused by heat of friction. If the clearance is too great, the powder along the die wall will build up, causing eccentricity as great as 0.003 to 0.005 inch. Such a build-up may also cause the punches to bind and score. This can be avoided by not having a larger clearance than is necessary.

The length tolerance should be somewhat liberal in comparison with that necessary with conventional methods of finishing if extra cost of machining the part is to be avoided. As the length of most parts made by powder metallurgy is governed by the "fill," and is regulated by the depth of "fill" and the compressibility of the powder, each part to be designed must be considered individually; the length tolerances on short pieces may be as small as from ± 0.002 to ± 0.005 inch, but longer pieces will require ± 0.010 inch or more. Table 1 gives recommended tolerances for parts of different lengths, diameters, flange sizes, and concentricity tolerances for various diameters.

Points to be Observed in Designing Parts with Recessions, Projections, and Counterbores

When parts are designed with radial projections and recessions, great care must be taken to avoid deep and narrow splines, which make it difficult to obtain complete powder "fill"; otherwise the powder at the time of filling may bridge across the narrow splines, resulting in a pressed part with less density and smaller size than is required. The projections also will be weak and porous in struc-

ture. Another disadvantage is that tools made to produce parts with this poor design will rupture when pressure is applied. Also, when parts are designed with these narrow projections, difficulties arise in ejecting the part from the die due to the increased surface area.

It is not good practice to have deep depressions or counterbores because when the powder is pressed to obtain them the part becomes denser than required. This will strain the punches at the time of pressing, and if the tool is light, it may rupture. With bosses, the opposite reaction takes place; if

Table 1. Recommended Tolerances for Powdered-Metal Parts

Length, Inches	Tolerance, Inches
up to 1	± 0.005
up to 1 1/2	± 0.010
up to 2	± 0.015
up to 2 1/2	± 0.020
up to 3	± 0.025
Diameter, Inches	Tolerance, Inches
up to 1	$\pm 0.0015^*$
up to 1 1/2	$\pm 0.002^*$
up to 2	$\pm 0.003^*$
up to 2 1/2	$\pm 0.004^*$
Flange Diameter, Inches	Tolerance, Inches
up to 1	± 0.004
up to 1 1/2	± 0.006
up to 2	± 0.008
up to 2 1/2	± 0.010
up to 3	± 0.014
up to 4	± 0.016
Flange Thickness, Inches	Tolerance, Inches
up to 1/4	± 0.004
up to 3/8	± 0.006
up to 1/2	± 0.008
Diameter, Inches	Concentricity (Total Indicator Reading in Inches)
up to 1	0.003
up to 1 1/2	0.004
up to 2	0.005
up to 2 1/2	0.006

*For parts that are pressed and not coined to size.

the required boss is too high and there is no way of shifting the material to equalize the pressure, the part will be weak and porous. A good rule to follow is to have the depressions, bosses, or counterbores not over one-quarter of the total length or section thickness, with a taper of about 0.008 inch in diameter for each inch in depth to permit easy withdrawal of the part from the die or punch.

When steps are formed in the design, each step should be at least 1/8 inch larger in diameter than the preceding one. As these steps may be produced either by steps in the die or by a secondary die or punch, enough shoulder should be formed so that there will be sufficient strength in the part. If the diameter of the step is too small, an inadequate powder "fill" will result, thus defeating the purpose of the design.

Parts that have odd shapes and heights greater than one-quarter of their length should be redesigned to meet powder metallurgy technique, so that they will meet the required specifications and can be ejected from the die.

Wall Thickness of Parts to be Produced by Powder Metallurgy

One difficulty in working to close tolerances results from the expansion or contraction of a part during sintering. An alternately thin and thick wall section will not expand or contract uniformly. When the hole is round and the outside diameter not a true diameter, this change in cross-section will cause the part to change in size after sintering, thus making it difficult to meet the customer's specifications.

With parts such as bushings, the wall thickness is perhaps one of the most important phases that the designer must take into consideration. It is therefore necessary that the relation between length and diameter be considered. If long parts with thin walls are to be pressed, the powder may bridge across the narrow opening between the die

wall and core rod and not fill the die completely. The result will be a porous part. The punches will also be extremely weak due to the slenderness of their walls. Table 1 gives the minimum wall thickness for parts of various sizes.

When flat and thin parts requiring high density are pressed, great care must be taken to make sure that the section is not too thin; otherwise, due to the lack of cushioning effect of the powder, the punches may rupture when pressure is applied. Although sections as thin as 0.015 and 0.020 inch have been pressed, in most cases these sizes are obtained by applying a pressure that will give a medium density, sintering, and then coining to the desired density. No flat sections of less than 0.032 inch should be pressed.

Parts with Holes, Keyways, and Inserts

Parts that have shaped holes, tapered holes, or keyways can be made by powder metallurgy through the use of a core rod. When the requirement is for parts having shaped holes—square, hexagon, half round or nearly any other shape—the core rod can be shaped to mate with the inside of both the upper and lower punches. When keyways are required, a key is inserted in the core rod with corresponding key splines in both the upper and lower punches, thus helping to shape the keyway when the part is pressed.

The forming of tapered holes is more difficult, and care should be taken at the time of pressing to prevent the top punch from contacting the taper on the core rod. A short distance at the top of the taper should have a straight section, so that the top punch will stop its downward movement on this straight section or above the taper part of the core rod. This will cause a flat section in the part which should not be less than 0.032 inch to prevent the core rod from becoming damaged.

Inserts are normally put into the part at the time of pressing, but may be pressed in after sintering. When a part produced by powder metallurgy is to be used as an insert, as in plastic molding, a vertical serration parallel to the axis of pressing can be put on the outside diameter, thus eliminating the need for a knurling operation.

For flanged parts up to 1 inch in diameter, the flange diameter should not be more than 1 1/2 times the outside diameter of the part. When parts require larger flanges, a more complicated die and punch arrangement must be used to help eject the part from the die, or else the overhang from the main body and the friction on the die wall will cause the flange to crack or break. The outside diameter of the part should also have a taper of at least 0.008 inch per inch of flange thickness in order to help eject the part from the die. The minimum radius on the inside corner where the flange

Table 2. Minimum Wall Thickness for Powdered-Metal Parts of Cylindrical Form

Maximum Over-All Length, Inches	Maximum Outside Diameter, Inches	Minimum Wall Thickness, Inches
1/2	1/2	0.032
5/8	3/4	0.040
3/4	1	0.045
7/8	1 1/8	0.050
1	1 1/4	0.055
1 1/8	1 3/8	0.060
1 1/4	1 1/2	0.065
1 3/8	1 5/8	0.070
1 1/2	1 3/4	0.075
1 5/8	1 7/8	0.080
1 3/4	2	0.085
1 7/8	2 1/4	0.090
2	2 1/2	0.095

unites with the body should be 0.010 inch. This radius will strengthen the part and help to eliminate cracking or breaking of the flange at the time of pressing.

Parts that have flanges projecting from the center of the body or more than one-quarter of the length from the end are difficult to form unless complicated dies and punches are used to position the powder in the die so as to obtain the required density, and to facilitate ejection of the part. Even with complicated dies and punches, it is difficult to say that a perfect part could be produced. With this design, a secondary operation would be needed.

Parts should not have too large a bevel or radius on their edges, because the punches will have a feather edge which may have a tendency to burr at the time of pressing. Also, the feather edges on the punch may break off or turn over and thus shorten the life of the tool, unless great care is taken to select and harden the tool steel.

Parts that have re-entrant angles or curves in an axial direction cannot be produced by powder

metallurgy because the presses now used for this process have only a straight up and down motion, with no side motion. Under these circumstances, a secondary operation is required.

When parts have changes in diameter greater than one-half their length, care must be taken to obtain the proper ratio between the die "fill" and the compressibility of the powder in order to obtain the required density and size.

Some parts produced by powder metallurgy require secondary operations such as drilling, tapping of holes on the side of the part, tapping of holes formed by the pressing operation, machining recesses on the end where it would be impossible to press the shape, and turning of steps that have a diameter only slightly larger than its preceding step. However, even when secondary operations are necessary, it will be obvious that a part can be produced by powder metallurgy at a considerable saving in time and material, as compared with machining the part to the required size and shape in the conventional way.

Ralph E. Flanders Elected to the U. S. Senate

THE distinguished career of Ralph E. Flanders reached new heights on November 5 when he was elected to the United States Senate from his native state of Vermont. He had previously been appointed to that office by the Governor of Vermont to occupy the seat which became vacant when the Honorable Warren R. Austin was appointed chairman of the United States delegation to the United Nations. Beginning with the new Congress, Mr. Flanders will sit in the Senate as the regularly elected representative of his constituency.

Mr. Flanders started life under modest circumstances, and was able to attend school for only eight years. Although he never had the opportunity of obtaining a college education, he has been awarded eight honorary degrees by leading American universities.

Upon leaving school, Mr. Flanders became apprenticed to learn the machinist trade, and after three years was a journeyman machinist. He worked at his trade for several years, and then joined the staff of *MACHINERY* as associate editor. The five years spent in that capacity have always been considered by Mr. Flanders as a period of education. He left *MACHINERY*

to go with the Fellows Gear Shaper Co., Springfield, Vt., and later accepted a position with the Jones & Lamson Machine Co., eventually becoming president of that concern, which position he retained until 1944, when he was elected to the presidency of the Federal Reserve Bank of Boston. He then became chairman of the board of the Jones & Lamson Machine Co.

Mr. Flanders has served as president of the National Machine Tool Builders' Association and as president of the American Society of Mechanical Engineers. In the year 1933, he was appointed to the Business Advisory Council of the Department of Commerce. From this Council he was assigned to the Industrial Advisory Board of the N.R.A. Other Government assignments included Industry Adviser to the O.P.A.; Special Adviser to the Navy on the Acceleration of Torpedo Production; and most important, membership in the Economic Stabilization Board. Mr. Flanders has also served as chairman of the Research Division of the Committee for Economic Development.

It is with this background and experience that Ralph E. Flanders enters the U. S. Senate.



Ingenious MECHANISMS

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and other Devices

Compact Table-Feeding Mechanism

By RUDOLPH SACHTLEBER

The mechanism here illustrated was designed to carry a chase or printing type frame *P* under the ram of a hydraulic press for making wax impressions from the type in the chase. The limited space available on the press prevented the use of the conventional crank movement, and made a compactly designed feeding mechanism necessary.

The table *A* on which the chase is loaded recipro-

cates between the loading position of the chase at the left and the working position *P*₁ at the right. The travel of the table is guided by ways *B*. Table members *C* form a slot *M* which is at right angles to the center line *X-X*, representing the direction of rectilinear movement of the table. Block *D*, which is a sliding fit in this slot, is free to revolve about the stud *S* at one end of crank-lever *F*. Crankpin *H* is turned by crank *G*, which is revolved by means of the driving shaft *E* to which it is pinned. The center line of the crankpin will follow a path shown by circle *J*.

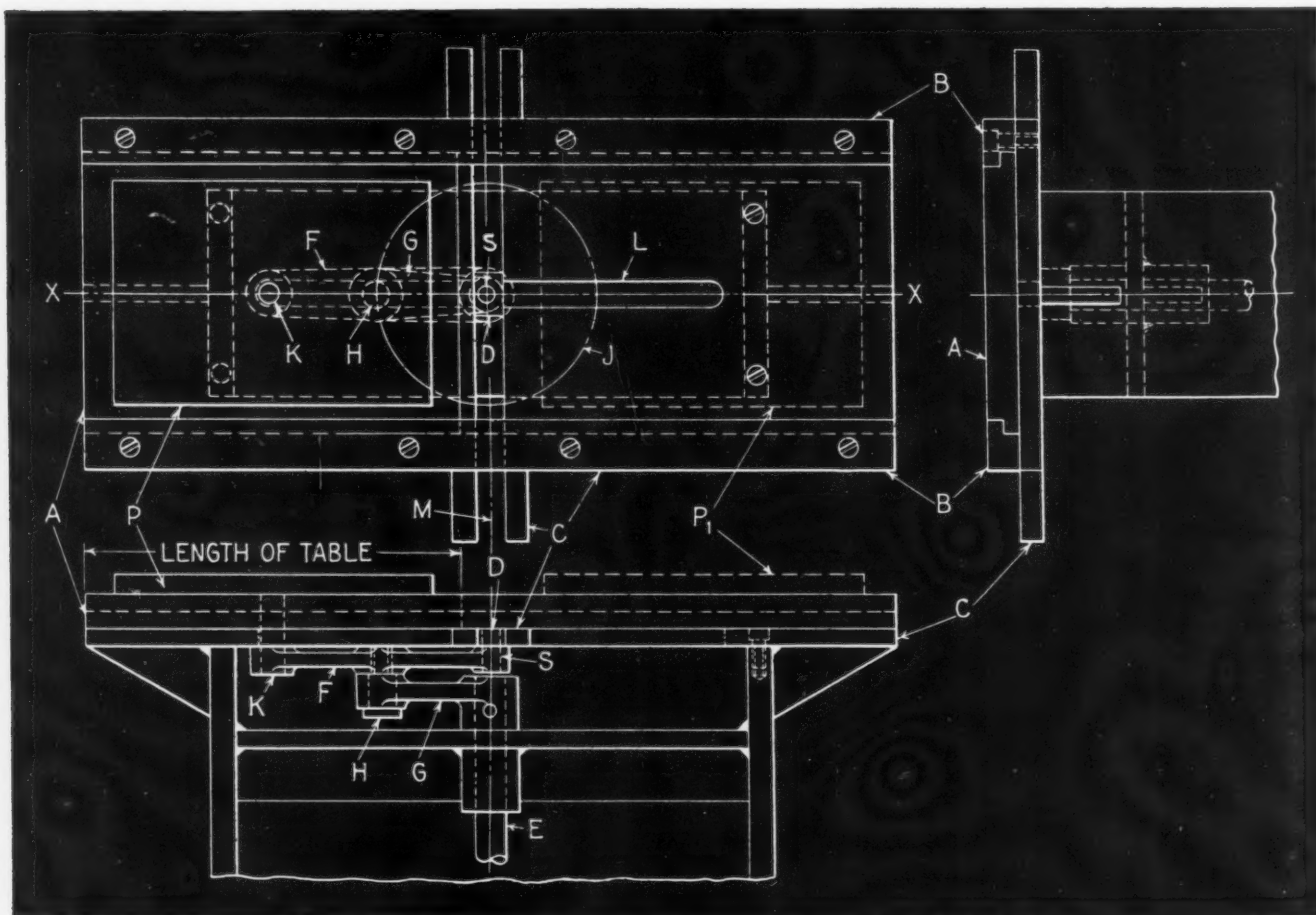


Table A is Reciprocated along Center Line X-X by Means of This Mechanism

The travel of one end of the crank-lever *F*, being fastened to block *D*, is confined to a reciprocating movement by the slot *M*. The other end of the crank-lever is fastened to table *A* by connecting-rod pin *K*. The travel of pin *K*, which carries the table with it, is confined by slot *L* formed by the table members *C* to a reciprocating movement. The common center line of the table and pin *K* follows the path indicated by center line *X-X*.

Quarter-Turn Mechanism for Transferring Sheets from Press to Oven

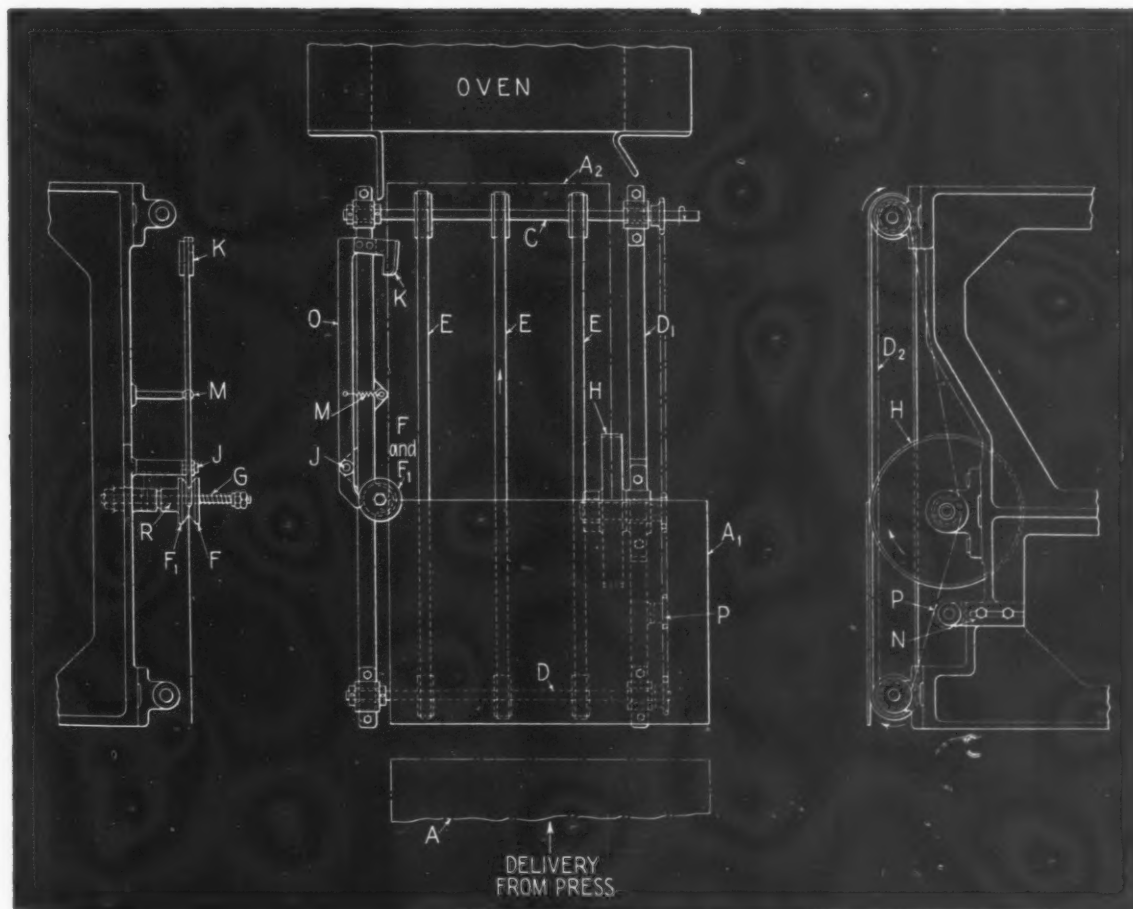
By P. E. VERAA

Tin sheets for making container parts are received from the conveyor belt of a printing or decorating press, swung through an angle of 90 degrees in a horizontal plane, and fed onto the conveyor of a drying oven by means of the mechanism illustrated. The work performed on the press necessitates that the tin plate be in the position shown at *A*. However, the long drying oven is narrow and will only accommodate the sheets when they have been turned to the lengthwise position shown at *A*₂. As it would have been costly to re-

build the oven to handle the greater widths, the quarter-turn mechanism was designed and located between the conveyors of the press and the drying oven.

Sheet *A* is delivered from the printing press and received on conveyor belts *E* in the position indicated at *A*₁. The surface speed of conveyor belts *E*, which rotate on pulleys mounted on shafts *C* and *D*, is greater than that of the press conveyor belts. The front left corner of the tin sheet comes in contact with the conical-shaped, friction disks *F* and *F*₁, and a portion of the sheet slips between the faces of the disks. These disks are free to rotate on stud *R*, and are pressed together by spring *G*. The tin sheet is thus gripped between the disks, and its forward motion is temporarily halted.

The sheet is swung about the disks, which act as a pivot, by means of the rubber-covered pulley *H*, which is in contact with the lower surface of the sheet. This pulley, which has a surface speed greater than that of conveyor belts *E*, turns the sheet to position *A*₂. As the sheet nears the desired position, its edge comes in contact with the face of the leather-covered bumper *K*. The force with which the sheet hits the bumper is sufficient to pivot lever *O* about stud *J* and cause the bevel-shaped end of the lever to separate friction disks



Tin Sheets are Turned from Position *A*₁, as They Leave the Press, to Position *A*₂, and are Fed into an Oven by Means of This Mechanism

F and F_1 , and compress spring G . The sheet is thereby released and allowed to continue its forward motion on conveyor belts E and onto the conveyor of the oven.

Lever O is returned to its original position as soon as the sheet passes bumper K by means of spring M . The tension of this spring must be carefully controlled, so that it will not cause the bumper to apply too much braking action on the edge of the moving sheet. Shaft C is turned by a motor-driven chain. Shaft D and pulley H are rotated by means of sprockets and a single chain driven by shaft C . Idler sprocket P mounted on bracket N is used to adjust the tension of the chain.

An Overload Relief Device for Machine Protection

By H. B. SCHELL

An ingenious device designed to protect a driven machine mechanism from breakage in the event of accidental jamming of the work during normal operation of the machine is shown in the accompanying illustration. The feature of this device is that it is so designed that all forces are self-contained, and when it is released, no axial force is exerted on bearings or moving parts.

The mechanism consists primarily of a lever A which transmits a rocking movement to shaft B through suitable linkage. Normally, lever A is free to swivel about shaft B . It is held in one position on the shaft by a bearing at the right and arm C and collar F at the left. With plunger D seated in

a conical socket in bushing E , motion is transmitted from lever A through arm C to shaft B , arm C being keyed to the shaft. Plunger D is held in the seated position by spring H .

The conical fit between plunger D and the socket of bushing E , as well as the load provided by spring H , should be designed for transmitting only the desired amount of torque. Then, when this predetermined torque is exceeded, the tapered end of plunger D will ride up out of its socket and the various parts of the device will become disengaged.

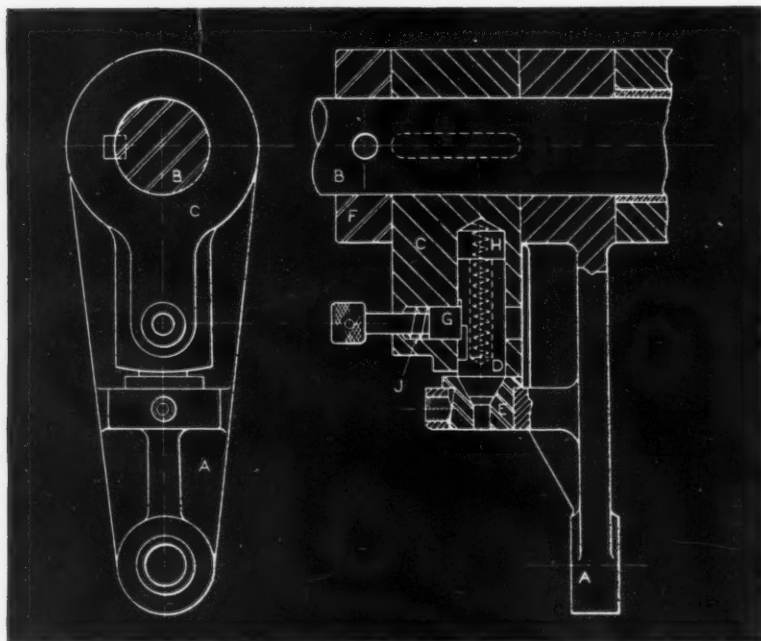
To keep the parts disengaged is the function of plunger G . At the top point in the disengaging movement of plunger D , the deeper of two flat spots on the plunger comes opposite the end of plunger G . Plunger G then snaps to the right and holds plunger D in the disengaged position. This permits the lever A to rock freely on shaft B until the device is manually reset, and power is, of course, no longer transmitted to shaft B through the mechanism.

To reset the device, the machine must first be cleared of the obstruction, after which plunger G can be withdrawn to the left and plunger D re-seated in the socket of bushing E . Plunger G is then free to return to the right, where it engages the shallower flat spot on plunger D . The purpose of this shallower flat spot is to prevent rotation of the plunger and to retain plunger D in position during disassembly of the mechanism.

This device is also applicable to rotary driving members, as well as to rocking members. In the case of rotating applications, the centrifugal force acting on plunger D would have to be considered as well as the load provided by spring H . The plungers D and G and bushing E should be hardened in order to insure satisfactory life.

* * *

The broadening of American Standards Association code requirements covering automotive safety glass to facilitate the use of plastics for motor vehicle glazing installations other than windshields has been recommended by the Society of Automotive Engineers. The Society's recommendations were developed by the SAE Plastics Glazing Committee, composed of SAE members and of other engineering experts from the automobile, glass, and plastic industries. Varied and exhaustive tests have led to the conclusion that, with the approval of state legislative and administrative agencies, synthetic plastic materials may be used, either singly or laminated, for motor vehicle windows.



Unique Device Designed for Protecting a Mechanism against Breakage if the Mechanism should Become Jammed by the Work

Tool Engineering

IDEAS

Lathe Attachment for Cutting Oil-Grooves

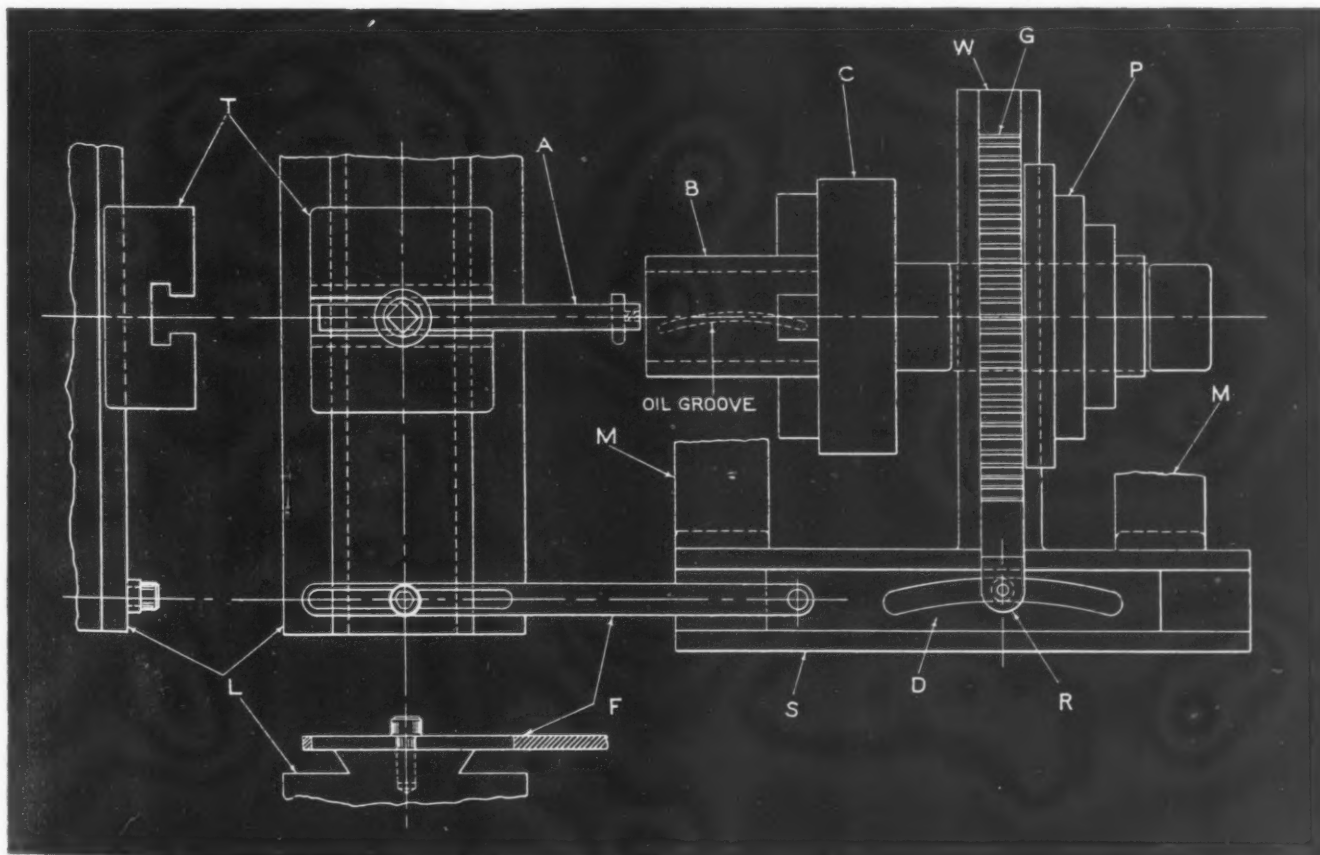
By HAROLD E. MURPHEY, Westerly, R. I.

Crescent-shaped oil-grooves can be cut in the bores of bushings by means of the lathe attachment here illustrated. The bushing *B* is held in chuck *C* of a belt-driven lathe. The tool bit is held in a conventional boring-bar *A*, which is mounted in toolpost *T* on the cross-slide of the lathe.

By disengaging the faceplate gear *G* from the cone pulley *P* of the lathe, the lathe carriage *L* can be traversed independently of the rotation of the

gear and chuck. As the cone pulley is rotated, thus advancing the carriage and tool toward the work, former connection *F*, which is fastened to the lathe carriage *L*, will force former *D* forward in slide *S*. The roller in the cam slot of former *D* thus causes rack *R* to move transversely. As the rack is in mesh with the faceplate gear, it turns the spindle of the lathe and the chuck with the work.

Former connection *F* has a slot in the end by means of which it is fastened to the lathe carriage, so that the carriage, with the toolpost and boring-bar, can be initially locked inside the bushing in correct relation to the cam slot in former *D*. The



Lathe Attachment for Machining Oil-grooves in the Bores of Bushings

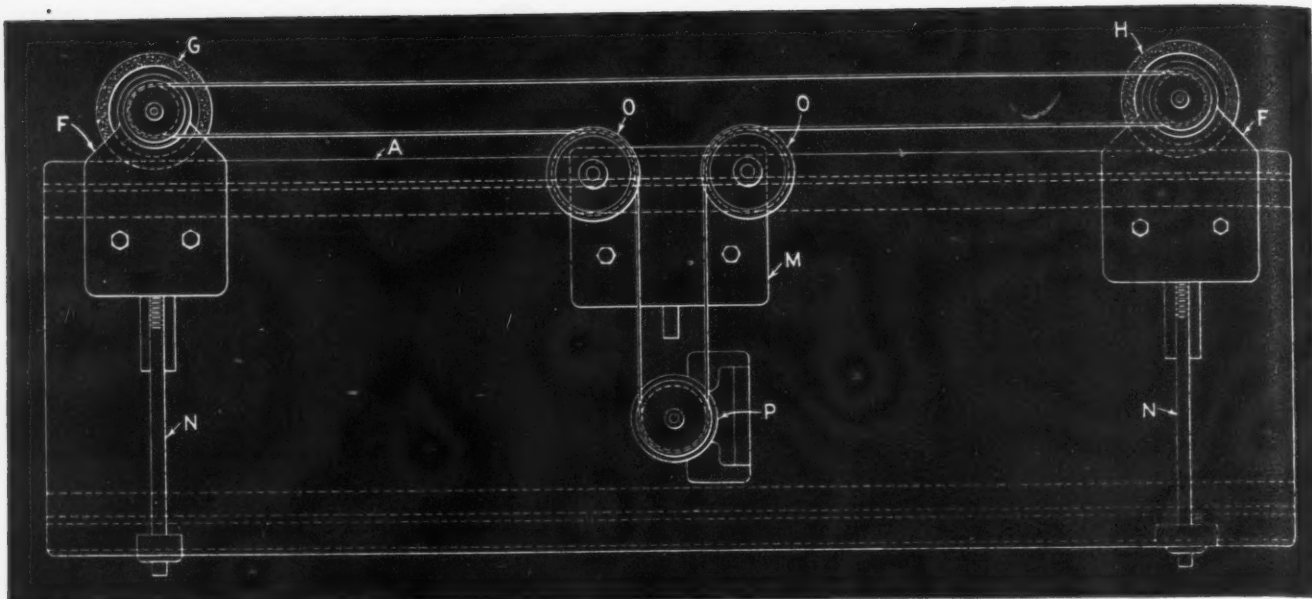


Fig. 1. Fixture for Grinding the Under Side of the Ledges that Support the V-ways on Machine Tool Beds Parallel with the Top of the V-ways

former connection is then clamped to the carriage by tightening the set-screw. The carriage is next traversed to a position corresponding to the start of the oil-groove to be machined. The tool is adjusted for the required depth of cut and the lathe is started.

The cam slot in former *D* can be made to suit the longest oil-groove required. Shorter oil-grooves can be machined with the same former by simply restraining the roller from traveling the entire length of the slot. Former *D* is a sliding fit in slide *S*. This slide is fastened to the bed of the lathe by means of brackets *M*. Rack *R* is a sliding fit in slide *W*, which is fastened to the headstock.

Fixture for Grinding the Under Side and Top of Machine Tool Ways Parallel

By I. F. YEOMAN, Elkhart, Ind.

The under side of the ledges that support V-ways on the beds of machine tools are ground parallel with the top of the vees by the use of the fixture illustrated in Fig. 1. The fixture is placed on top of the finish-ground V-ways of the machine tool, as may be seen from the end view in Fig. 2. After adjusting the grinding wheels to the proper position, the fixture is slowly pushed by hand the length of the bed. The travel of the fixture should

be sufficient to cause each grinding wheel to clear its end of the bed. The fixture is then turned around and the ledge on the other side of the machine is ground.

The fixture consists essentially of a cast-iron body *A*, which straddles the ways, and a rail *B*, cast integral with it, which slides on one of the V-ways. The rail *C*, which slides on the other V-way, is detachable. This rail is provided with a tongue that fits in the slot in which it is shown, or in slot *D* or *E*, depending upon the width of the machine bed.

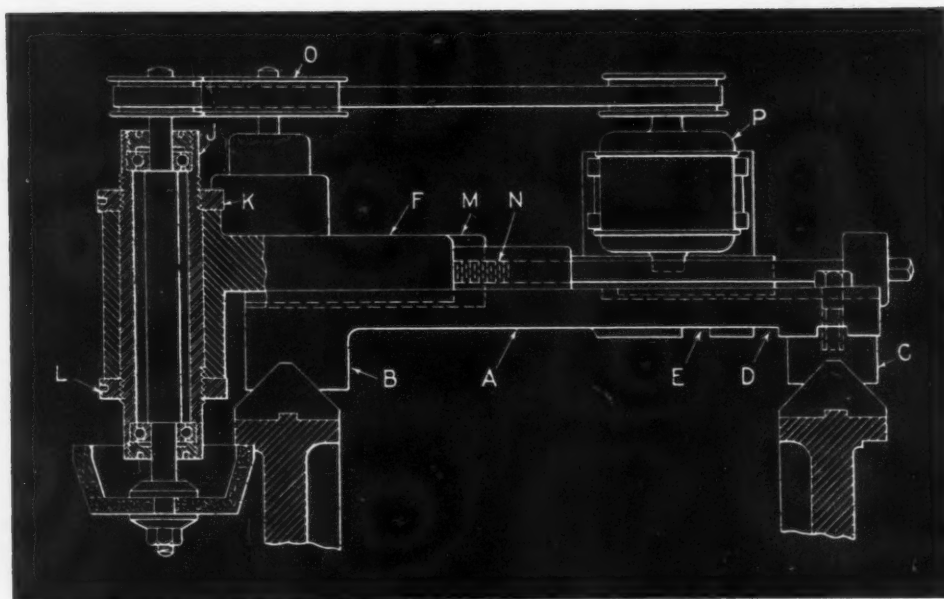


Fig. 2. End View of Fixture Illustrated in Fig. 1, Showing Cross-section of Grinding Spindle

An adjustable bracket *F* is located at each end of the fixture. These brackets overhang the side of body *A* on which the non-adjustable rail *B* is located. Each bracket carries a grinding wheel and spindle (*G* and *H*) which are mounted on ball bearings supported in sleeves *J*. The brackets, with the spindles and grinding wheels, can be moved horizontally by means of adjusting screws *N*. Vertical movement of the grinding wheels and spindles is accomplished by adjusting collars *K* and *L*. Bracket *M*, which is centrally located along the same side of the fixture, supports two idler pulleys *O*. The driving motor *P* can be moved horizontally on its base to provide proper belt tension.

Automatic Feeding and Ejection of Small Cylindrical Parts

By MARK W. PURSER, Tenaflly, N. J.

Small cylindrical work-pieces are automatically fed into and ejected from a tapping fixture by means of an ingenious set-up developed by the Farmingdale Aircraftmen Mfg. Corporation, Farmingdale, N. Y. All that is required of the operator is to load the feed-chute with work-pieces, operate a foot-valve, and manipulate the feed-lever of a drill press to which a tapping head is attached.

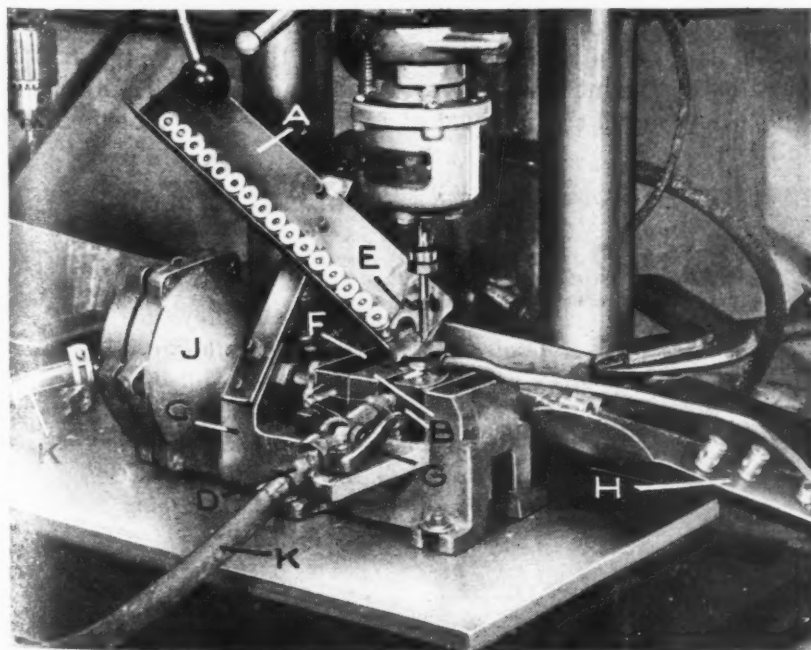


Fig. 1. Set-up for Automatically Feeding Small Cylindrical Parts into a Tapping Fixture and Ejecting them when the Operation Has Been Completed

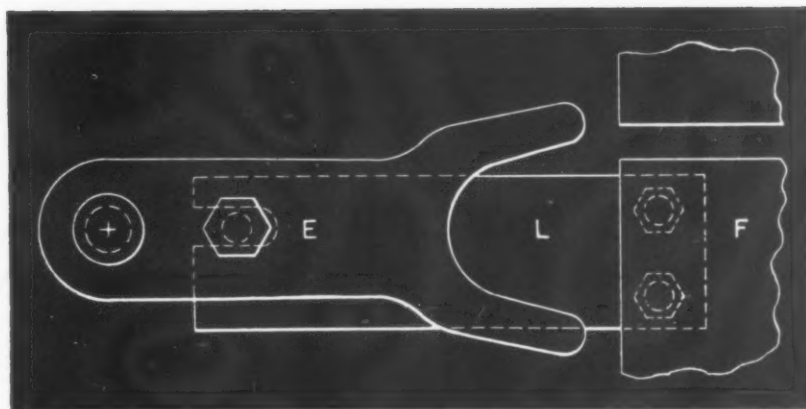


Fig. 2. Fork *E*, Which Moves Each Piece into Tapping Position in the Set-up Shown in Fig. 1, is Connected to Vise Jaw *F*, by Link *L*

As shown in Fig. 1, the work-pieces are fed by gravity down the chute *A* to a split holding fixture *B*. Each half of this fixture is attached to one jaw of an air-operated vise *C*. The valves for opening and closing the jaws of the vise are foot-operated.

At the lower end of the feed-chute is a swiveling, two-pronged fork *E*. This fork, as shown in Fig. 2, is connected by link *L* to one of the vise jaws *F*. Each time the vise opens, the fork is rocked, thus permitting one more work-piece to fall into position in the holding fixture.

Also, when the vise opens, the air being exhausted from chamber *J*, which is still at a pressure greater than atmospheric, expands into hose connection *K*. This hose is connected to a normally closed nozzle valve *D*. Movable vise jaw *F* is wired to handle *G* of the nozzle valve, so that when the vise opens, the valve is caused to open. The air thus released from the valve blows the finished work-piece out of the vise fixture into chute *H*. The air blast also removes any chips that may be on the fixture or vise jaws.

* * *

Surplus Equipment Presented to Cornell University

Diesel engines and related equipment valued at more than \$2,000,000 were officially transferred to Cornell University recently as an outright gift from the Navy Department. This equipment, constituting one of the most complete Diesel-engine installations in the United States, was accumulated in the Diesel Engine Laboratory of the university during the war period. In this laboratory, the Navy and the university gave more than 2700 officers special training in Diesel engineering.

Materials of Industry

THE PROPERTIES AND NEW APPLICATIONS OF MATERIALS USED IN THE MECHANICAL INDUSTRIES

Low-Temperature Alloy for Molds, Patterns, and Dies

"Moldaloy," a new alloy with wide possibilities as a molding material for the casting of plastics, rubber, and other materials, has been introduced recently by Trethaway Associates, 37 Wall St., New York City. The new alloy is recommended for molds for casting low-temperature melting plastics; rubber molds; wax molds for precision casting; models for engraving machines; master patterns; forming dies for thin sheet metals and thermoplastics; proof casting of molds, forging dies, etc.; and chuck jaws for holding irregular-shaped pieces. It can also be used as a protective coating on wood patterns and core-boxes.

"Moldaloy" melts at 430 degrees F., has a hardness of 22 Brinell, a compressive strength of 8000 pounds per square inch, a tensile strength of 11,500 pounds per square inch, and a shrinkage of approximately 0.001 inch per inch.201

Plastic Material for High-Frequency Applications

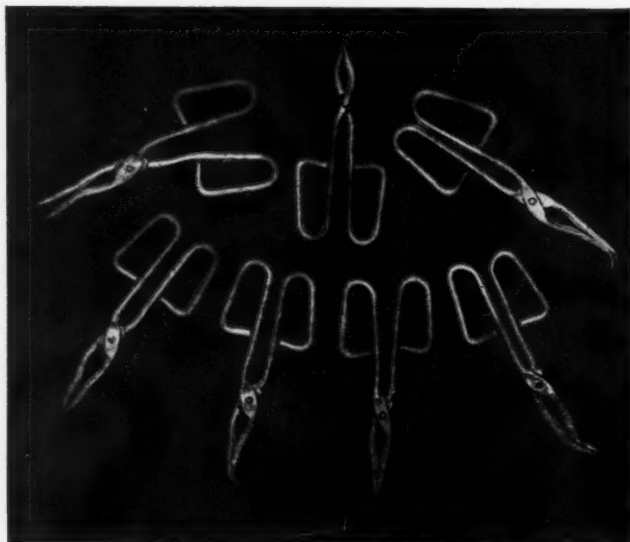
A plastic material with characteristics of advantage in the manufacturing of television, frequency-modulation radio and radar sets, and many other ultra high-frequency insulating applications

has been announced by the Plastics Divisions of the General Electric Co., Pittsfield, Mass.

The new plastic, known as "Textolite No. 1422," possesses a very low power factor with an ASTM heat distortion of 105 to 113 degrees C. It machines readily enough to be adaptable to automatic and semi-automatic fabricating equipment. It can be used in many fields where compression and injection molded plastics are not suitable because of the close tolerances or where they do not possess the necessary combination of heat resistance and electrical properties. Being a cast plastic, it is also applicable to small-quantity production...202

Protective Light-Reflecting Coating for Spray Booths

A protective coating for spray-booth side walls, known as "Triad PR," has been developed by the Detrex Corporation, Detroit 3, Mich. This compound is readily applied to the side walls of either wet or dry spray booths with brush or spray gun, and provides a light-reflecting finish that withstands mild abrasion. The resulting surface improves visibility in the booth and is easily flushed off with water or steam, carrying all surface deposits with it. It also aids the speedy stripping of paint from conveyor hooks and spray booth louvers and the removal of frit in vitreous enameling..203



These Hand Tools, Used by Reynolds Metals Co. for Feeding Parts to Punch Presses, are Made from 3/8-inch Aluminum Bar Stock. Although Bulky in Appearance, They are Light and Comfortable to Handle. They are also Soft Enough to Avoid Damaging Dies if Caught in the Press

Aluminum Brazing Flux Suitable with General-Purpose Welding Wire

Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., announces a new flux for aluminum brazing called "Elite," which has physical properties that make it possible to use Airco No. 26 welding wire for brazing 2S, 3S, 53S, and 61S aluminum. 204

Pickle Control Improves Sulphuric-Acid Pickling Cycle

Oakite Pickle Control No. 3, a yellowish-brown, free-flowing powder with a density one-half that of water, is a recent addition to the line of Oakite Products, Inc., 26 Thames St., New York 6, N. Y. It is intended for use in inhibiting hot sulphuric-acid pickling solutions, and can also be used in mixed sulphuric-hydrochloric acid baths in which sulphuric acid predominates.

Field tests have shown that Oakite Pickle Control No. 3 improves the pickling cycle, and that savings in metal, acid, and maintenance costs result, together with reduction in fuming, hydrogen embrittlement, pitting, and discoloration of work. By retarding the build-up of iron sulphate in solution, the Oakite inhibitor is said to minimize the frequency and cost of spent liquor disposal....205

Light-Weight Foamed Plastic Developed by du Pont

Development of a new foamed plastic, so light that 4 cubic feet can be easily balanced on the fingertips of one hand, has been announced by E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Delaware. This new plastic, which is lighter than cork, is called "cellular cellulose acetate." It

combines insulation against heat and cold with unusual structural strength when bonded between two sheets of metal, wood, or plastic. Aluminum, magnesium, steel, and stainless steel are among the metals that can be bonded to this material. Cellular cellulose acetate will be made in four ranges of density—4 to 5, 6 to 7, 7 to 8, and 8 to 9 pounds per cubic foot.206

Water-Repellent Grease Used for Factory Lubrication

For factory lubrication of tractor track rollers and other applications requiring a soft, water-repellent, non-separating grease, the Texas Co., 135 E. 42nd St., New York 17, N. Y., has developed Texaco Star Grease No. 0. Made with lime soap, this product is heat stable and resistant to both water and oxidation.207

Compound Protects Copper and Copper Alloys from Corrosion

A new brass corrosion inhibitor, developed by Dr. Johan Bjorksten, industrial research chemist, is now being manufactured by the Bee Chemical Co., 63 E. Lake St., Chicago, Ill., under the trade name of "Brass Lyfe." It is furnished as a 10 per cent solution of the active organic chemical in butyl cellosolve. The compound is specifically for copper, and is not effective on any metals other than copper alloys. It is mixable with oils, lubricants, and lacquers, and when added to these, completely stops the corrosion of copper-containing alloys, whether due to oxygen, organic acids, or amines. Drawing compounds and soluble oils embodying this new brass corrosion preventive are also being made available. 208

To Obtain Additional Information on Materials of Industry

To obtain additional information about any of the materials described on these pages, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning name of material as described in December, 1946, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Fill in your name and address on the blank below. Detach and mail within three months of the date of this issue to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

NAME..... POSITION OR TITLE.....
[This service is for those in charge of shop and engineering work in manufacturing plants.]

FIRM.....

BUSINESS ADDRESS.....

CITY.....STATE.....

Industrial Relations Main Topic of National Metal Trades Meeting

THE keynote of the forty-seventh annual meeting of the National Metal Trades Association, held at the Commodore Hotel, New York City, November 14 and 15, was "Management Must be Free to Manage." This subject was dealt with by nationally known industrial executives from various points of view. Henry W. Jones, Jr., president of the American Tube Bending Co., New Haven, Conn., spoke on "Management's Rights and Free Speech"; William B. Turner, president of the Walker-Turner Co., Plainfield, N. J., dealt with "Management's Functions"; and John C. Gall, of Washington, D. C., addressed the meeting on "Government Seizure and Collective Bargaining." Other subjects that received attention were "Unionization of Foremen," and "The Veteran and His Place in Industry."

H. H. Kerr, president of the Boston Gear Works, Inc., Quincy, Mass., who as president of the Association presided at the meeting, tersely stated the general scope of the problems that face the industry in his invitation to the meeting, as follows:

"During the present period of political and industrial uncertainty, members of the Association are invited to gather together for consideration of common problems and common interests.

"The shortages, red tape, and the confused state of industrial relations that were thought a part of the war are still with us, for the most part, in peace. Only cooperative effort—the selection of the best in all of our experiences—will clarify the situation."

In his address on the rights and duties of management, Henry W. Jones said: "Management must either manage the business or not manage it. There can be no half-way mark—no divided authority or responsibility." He further urged management to exercise its rights of free speech within the guarantee of the Constitution of our country.

Senator A. W. Hawkes of New Jersey urged the repeal of the Wagner Act because "it has been injurious to the rights of free working men, and has



Howard Goodman, Newly Elected President of the National Metal Trades Assn.

unfairly destroyed the rights of capital and management."

The following resolution relative to the Wagner Act was unanimously adopted:

"The National Labor Relations Act (Wagner Act) has failed in its purpose to diminish labor disputes. It has become the instrument by which a few labor union leaders have been enabled to nullify the freedom of millions of workers. It has deprived employers of equality before the law in the use of their properties. It has permitted irresponsible labor union leaders to regiment forces so powerful as to jeopardize the welfare and future of all the people of the nation.

"We are convinced that repeal of the National Labor Relations

Act is vital to the public welfare and the public safety. We do not seek any special privilege. We do not seek to circumscribe or restrict the lawful conduct of any person or any group or organization of persons. We seek liberty and freedom for the individual. We seek equality before the law for everyone. We will support legislation which embodies the following principles:

"1. The right of every worker to deal with his employer by collective bargaining through any agency he chooses.

"2. The right of every worker to deal with his employer directly as an individual, if he chooses.

"3. The right of every individual to work, or not, as he chooses.

"4. The right of every individual to go to and from his work unmolested.

"5. Equality under the law and the protection of minority rights.

"6. Monopolistic activities of all groups, whether employer or employee, must be controlled in the public interest."

Howard Goodman, president of the Goodman Mfg. Co., Chicago, Ill., was elected president of the Association; T. J. Morton, Jr., president of the Hoosier Cardinal Corporation, first vice-president; and Joseph L. Kopf, president of Jabez Burns & Sons, Inc., second vice-president and treasurer.

Shop Equipment News

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

LeBlond Dual-Drive Lathe with Separate High- and Low-Speed Ranges

The new Dual-Drive lathe announced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio, is built with two separate spindle drives, one a gear drive that provides four low and four intermediate speeds for heavy-duty turning and thread cutting, and the other a belt drive that furnishes four high speeds with full power for use with carbide tools. The gear drive from the main V-belt motor drive provides low speeds of 28, 41, 60, and 95 R.P.M., and intermediate speeds of 134, 193, 282, and 445 R.P.M. The direct belt drive is obtained through four gear speed changes to a high-speed shaft, then directly to the spindle through a second double V-belt drive. This drive completely eliminates the heavy final gear train drive to the spindle employed for the low speeds. The high-speed drive gives four speeds of 540, 782, 1140, and 1800 R.P.M.

Operation of the Dual-Drive lathe is exceptionally simple, all twelve spindle speeds being controlled by a single lever. This lever is fitted with a plate marked with all twelve spindle speeds and a guiding arrow, as shown in Fig. 2, to facilitate quick accurate setting for the desired speed. The rapid speed selector for obtaining the correct spindle speeds for commonly machined metals is located on the headstock beside the speed control lever. After first determining the correct speed, the operator merely shifts the lever to bring the guiding arrow to the speed required.

The lathe has a totally enclosed quick-change feed-box. Lubricant is pumped automatically from the main oil reservoir to the gears. There are forty-eight gear-drive feeds and forty-eight direct belt-drive feeds. The gear-drive feeds range from 0.0017 to 0.1062 inch, and the belt-drive feeds from 0.0004 to 0.026 inch. The gear drive for cutting threads provides means for cutting forty-eight different pitches ranging from 4 to 224 threads per inch. The lead-screw has six threads per inch.

The clutch and brake have two control stations, one on the apron for use when cutting near the tailstock, and another at the headstock to permit rapid acceleration and smooth, quick stops. Multiple automatic length stops are provided for use wherever work with multiple shoulders must be turned to accurate lengths. One-shot lubrication obtained by a single movement of a plunger on the apron forces lubricant to all apron, cross-slide, and carriage shear bearings. The one-piece double-wall apron totally encloses the positive feed clutch and gear train. A single lever controls both the cross-slide and carriage movements, and is interlocked to prevent engagement when the lead-screw is in use.

The push-button electric control panel contains the main drive motor, start-stop push-buttons, and drum switch for presetting the direction of motion. Although a coolant sys-

tem may not be required, the motor control panel is completely wired and fitted with coolant pump start-stop push-buttons, so that the pump, piping, and tank can be added at any time. Both circuits have overload and under-voltage protection, and are self-contained in a single control box.

The swing over the ways is 15 inches, and over the compound rest 9 1/2 inches, and the distance between the centers 30 inches. The steadyrest capacity is 4 inches, and that of the follow-rest, 2 3/4 inches. Tools 1/2 by 1 inch in size are used. The spindle nose type collets have a capacity of 1 3/8 inches, while the draw-in type collets have a capacity of 1 inch.

The diameter of the hole through the headstock spindle is 1 1/2 inches. The spindle has a Morse No. 4 center, No. L00 spindle nose 2 3/4 inches in diameter. The regular lathe bed length is 5 feet 9 inches,

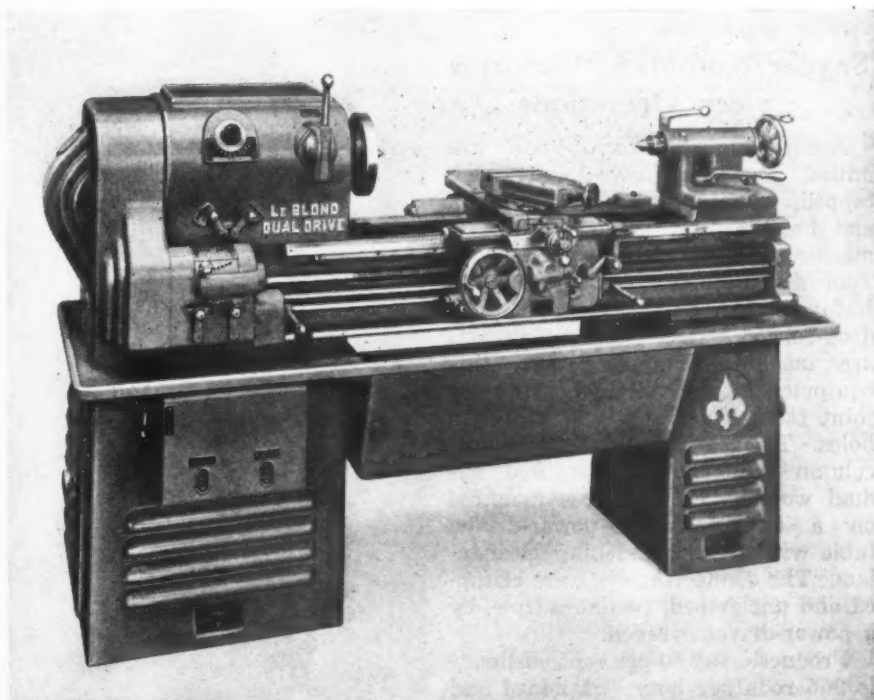


Fig. 1. LeBlond Dual-Drive Lathe with Double Speed Range



Fig. 2. Close-up View of Single Lever Speed Control and Rapid Speed Selector of New LeBlond Dual-Drive Lathe

width 11 inches, and depth 9 3/4 inches. The bed length can be increased in increments of 12 inches to any desired size. The carriage length on the ways is 17 1/4 inches, and the bridge width 6 1/4 inches. The tailstock spindle is 2 3/16 inches in diameter, has a travel of 5 1/2 inches, a Morse No. 4 center, and a hole 15/16 inch in diameter. Standard equipment includes a reversing type 3-H.P., 1800 R.P.M. motor. The net weight of the machine is 2450 pounds. 51

Snyder Automatic Performs Sixteen Operations

Automobile connecting-rods are milled, sawed, drilled, reamed, tapped, countersunk, counterbored, and burred in a special automatic machine recently built by the Snyder Tool & Engineering Co., 3400 E. Lafayette St., Detroit 7, Mich. The drop-forged steel connecting-rods are machined completely on this equipment except for the bearing-cap joint faces and crank- and wrist-pin holes. The machine is of the center column type construction, and has dual work-holding fixtures mounted on a twelve-station power-driven table with Geneva indexing mechanism. The connecting-rods are clamped and unclamped, two at a time, by a power-driven wrench.

Production at 80 per cent efficiency is 266 rods per hour. Standard and special machining units have individual motors and drives which oper-

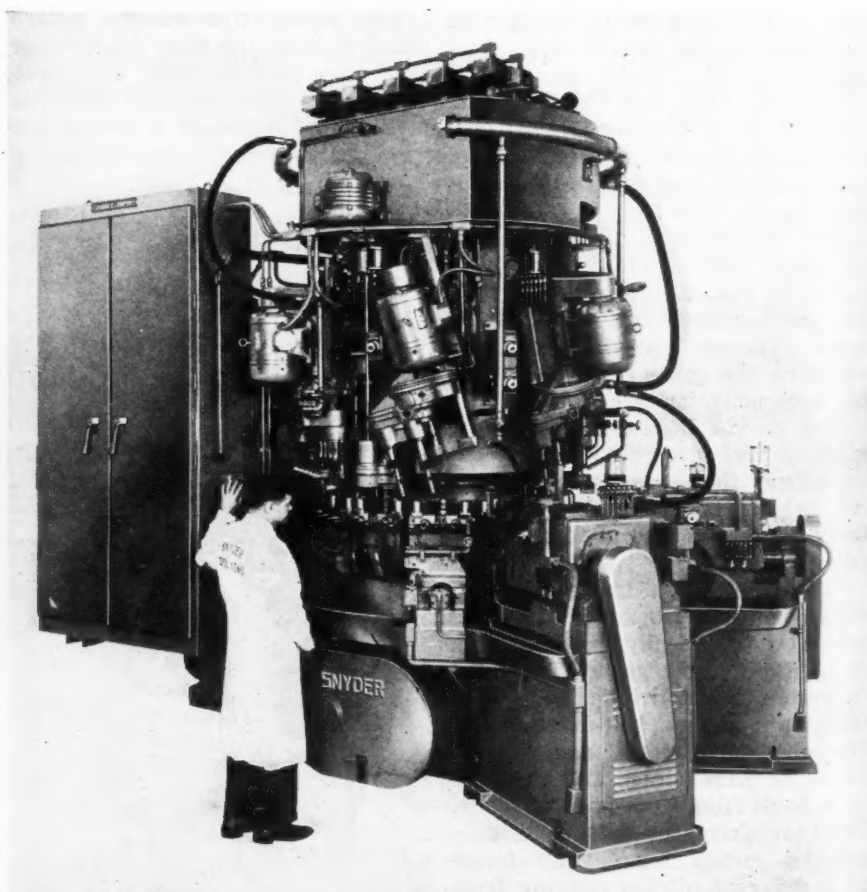
ate through a change-gear box and V-belts. They are hydraulically fed except for the tapping head, which is traversed to and from the operating position hydraulically, the actual tapping movement being accom-

plished by a lead-screw. High-speed steel tools operating at 60 surface feet per minute are employed, and tapping is performed at a speed of 30 or 40 feet per minute.

All tools are mounted in standard adjustable tool-holders except the cutters, counterbores, and counter-sinks, which are provided with arbors and special adjustable holders. The control panel includes cycle starting button, emergency return button for withdrawing all units from the work, and individual unit cycle buttons for use in setting up tools. The coolant is pumped from a central unit, and all lubrication facilities are readily accessible.....52

Hydraulic Flow Regulator

An automatic flow regulator for hydraulic systems where unlimited flow in one direction is required with a predetermined rate of flow in the opposite direction is announced by the Waterman Engineering Co., 721 Custer Ave., Evanston, Ill. Hydraulic machine tools and lifting devices are accurately controlled at predetermined speeds and insured against sudden release of hydraulic pressure by means of these regulators.53



Snyder Automatic Designed to Machine Automobile Connecting-rods

Cincinnati "Hypro" Automatic Car-Wheel Boring and Turning Machine

The Cincinnati Planer Co., Cincinnati 9, Ohio, has just developed a machine of completely new design, called the "Hypro" automatic boring and turning mill, which is intended primarily for the machining of rolled-steel car wheels. This machine is said to be capable of producing car wheels that are exceptionally accurate with respect to balance and have an improved finish. The production rate is approximately six finished wheels per hour.

The chucking equipment holds the wheel in position on the table in such a manner that the center hole can be bored at the same time that the rim, flange, and tread are being machined. The chucking arrangement is designed to accurately center the wheel, so that after machining, the rim will have a uniform thickness and be accurately balanced. This arrangement also provides for faster chucking, since the chuck jaws can be operated by one centrally positioned lever.

Operation of the machine is fully automatic. The car wheel is picked up by the hoist mounted on top of

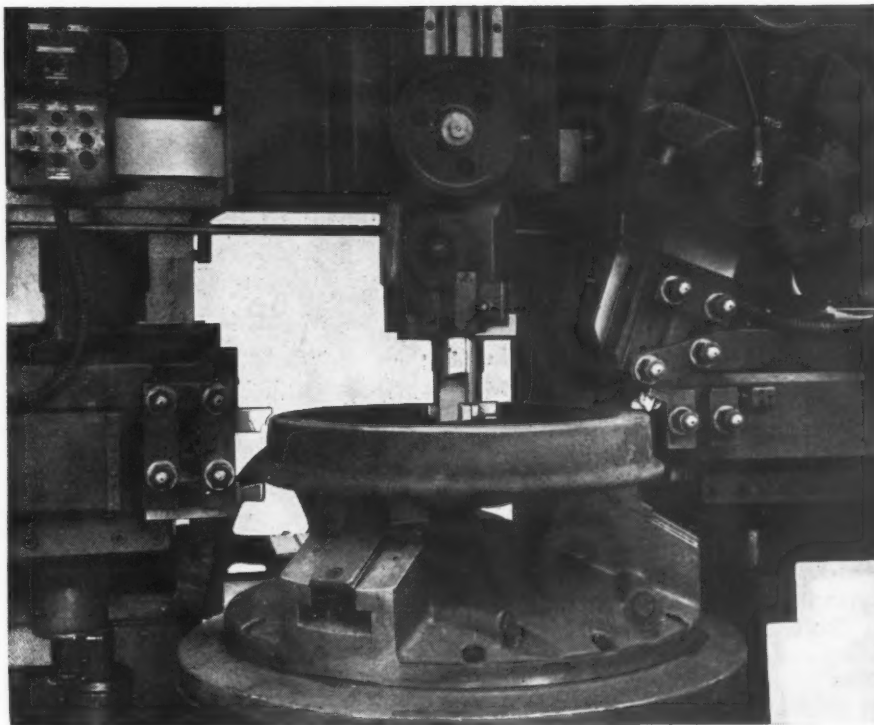


Fig. 2. Close-up View of Rough Car Wheel Held by Three-jaw Chuck

the machine and is lowered until it rests on the chuck seats. The operator then moves the lever that starts the hydraulic mechanism, which

causes the chuck jaws to come in contact with the wheel and lock it securely to the table. Next, the operator presses the automatic-cycle button on the machine, causing the boring and facing head, the rim turning head, and the two side-heads to travel inward until they come in contact with the work, at which time the cutting feeds are engaged. The cutters automatically complete their respective operations and return to their starting positions.

Carbide tools with high negative rakes are used for all turning operations, while the tools employed for boring and facing are of high-speed steel. Generated cuts are employed to obtain fine finish and a high degree of accuracy. The boring and rim-turning heads are equipped with Thymatrol electronically controlled motors. Both side-heads are provided with General Electric contouring attachments for finishing the required taper and contour surfaces on the tread and flange of the wheel. The traverse and feed motions to all heads are obtained through electronically controlled motors, mounted individually on the heads.

The machine is driven by a 100-H.P. motor, and has table speeds of 5 to 25 R.P.M. All gears and shafts are mounted in anti-friction bearings and are preloaded. The machine illustrated is arranged to accommodate wheels in sizes ranging from 33 to 40 1/2 inches, but machines for other sizes can be furnished.....54

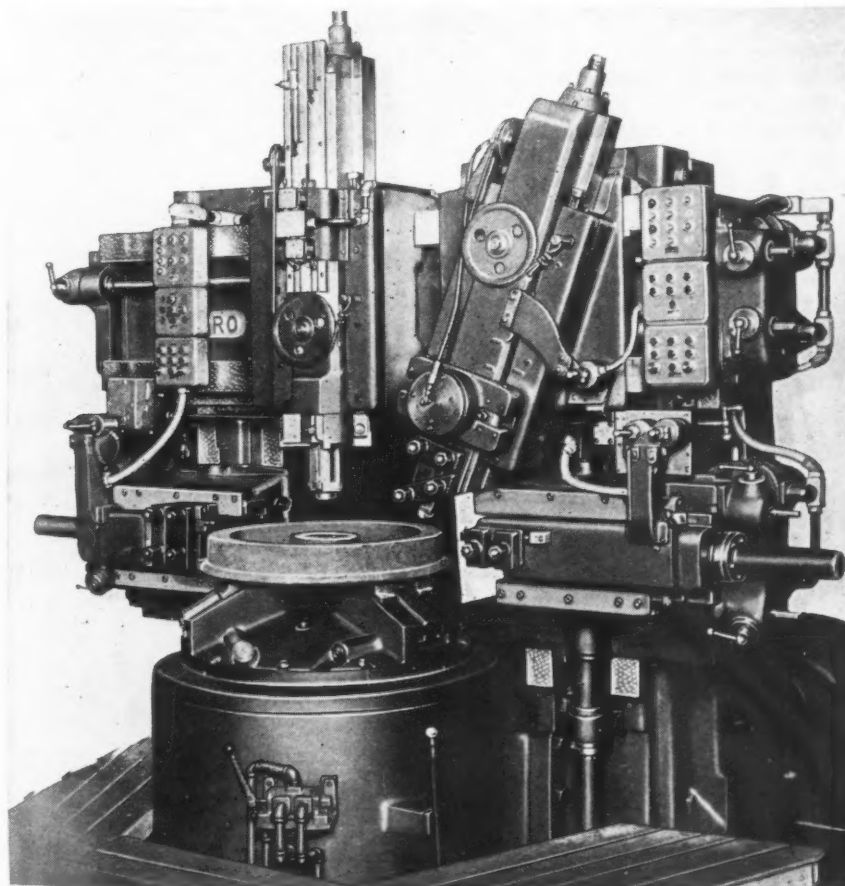


Fig. 1. Automatic Car-wheel Boring Mill Built by Cincinnati Planer Co.

G-E Automatically Controlled High-Temperature Laboratory Furnace

A box type furnace designed to meet modern laboratory requirements for high, automatically-controlled temperatures has been announced by the Industrial Heating Division of the General Electric Co., Schenectady 5, N. Y. The new furnace can be used in such applications as melting and bright annealing of metals, sintering of powdered metals, reduction of metallic oxides, ceramic firing, copper and silver alloy brazing of metals, and other work requiring operating temperatures up to 3100 degrees F. Since the heating units must be protected against oxidation, the furnace is limited to operations that can be performed in a protective atmosphere.

The heating units are rated at 20 kilowatts, 65 volts, single phase at 3100 degrees F., and consist of molybdenum rods formed into sinusoidal loops supported inside the heating chamber, which is 4 inches wide, 4 1/2 inches high, and 25 inches long. This chamber is lined with refractory brick backed by heat insulation. The top of the chamber is removable for servicing.

A cooling chamber permits materials to be cooled in a protective atmosphere, preventing oxidation of the charge. This water-jacketed chamber is separated from the heating chamber by a manually operated sliding door. The doors of the heat-

ing and cooling chambers are provided with manually-operated flame curtains to prevent loss of atmosphere when the doors are open.

Automatic temperature control is

provided by a standard type temperature control instrument mounted on the operating panel. This instrument can be either of the strip chart, round chart, or indicating type, and operates from a radiation thermocouple focused on the interior wall of the heating chamber.55

Pratt & Whitney Roll Thread Comparator with Pressure Control

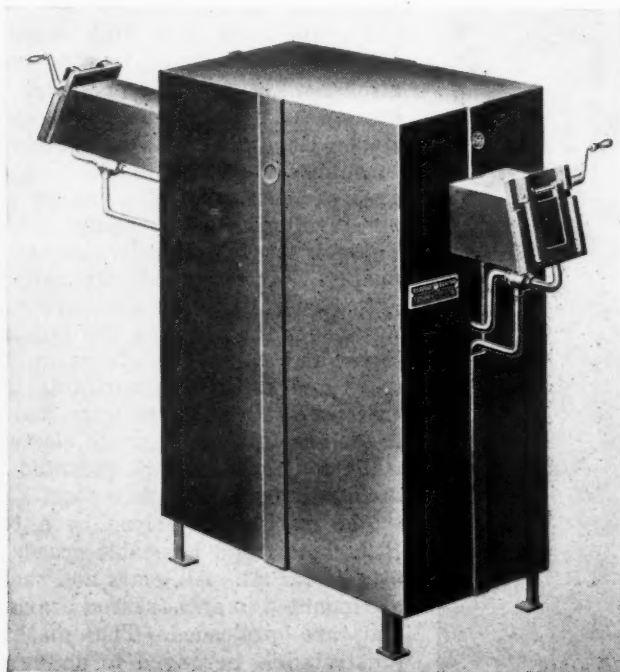
A new model roll thread comparator with pressure control has been brought out by Pratt & Whitney Division Niles-Bement-Pond Co., West Hartford 1, Conn., to enable small-diameter screws of fine pitch to be easily and accurately inspected. This comparator is especially designed to meet the requirements of the fine instrument and related industries in which thread inspection is necessary on screws of diameters ranging from 0.060 to 0.216 inch with 80 to 28 threads per inch National Form 60-degree angle.

The comparator uses the J-S gaging principle with a pressure control feature which relieves the operator of the responsibility of judging borderline cases. The signal light instantly shows the result of a full "Go" and "Not Go" functional check on the pitch diameter, minor diameter, lead, and angle. The screw to be gaged is placed in the workholder, where it is held on its major diameter. The operating lever is

then depressed to present the screw to the gaging rolls. The signal light is on except when excessive pressure is applied, at which time the light goes out. The gaging pressure can be easily adjusted to suit the work. Correctly threaded screws pass the "Go" rolls without resistance (light on), but will not pass through the "Not Go" rolls without resistance (light goes out). Over-size screws meet resistance at "Go" rolls (light goes out) while under-size screws pass through "Go" and "Not Go" rolls (light stays on).56

"Cerny" Twelve-Speed Band Saw

A new band saw known as the "Cerny," with a vibrationless blade which can be operated at twelve different speeds ranging from 85 to 1750 feet per minute, has been placed on the market by the Ermac Co., 5531 S. Vermont Ave., Los Angeles



G-E High-temperature Laboratory Furnace with Automatic Control



Roll Type Thread Comparator Added to the Pratt & Whitney Line

37, Calif. It is claimed that provision for selecting the correct speed for each material sawed, whether wood, plastic, aluminum, cold-rolled steel, angle-iron, tool steel, or cast iron, makes it possible to double the life of the saw blade. Special attention has been given in the design to eliminate any possibility of injury to the operator through blade breakage.

General specifications include: Throat depth, 17 1/2 inches; distance from table to guide, 10 1/2 inches; distance from floor to table, 44 inches; over-all height, 72 inches; width, 38 inches; and breadth, 20 inches. The machine requires a floor space of 39 by 39 inches. The 20- by 20-inch cast-iron alloy table is surface ground, and can be tilted to an angle of 45 degrees for sawing operations. Each of the three band-saw wheels has two sealed bearings. The guides of hardened tool steel are fully adjustable. Four sizes of guide pins are furnished for blades from 1/8 to 5/8 inch wide, but ball-bearing guides can be provided if desired.



"Cerny" Band Saw

Blades from 98 to 102 inches long can be used. The machine can be obtained with a 3/4-H.P., 900 R.P.M. motor, or it can be furnished without the motor.57

quired, and no chemicals, baths, or inks are used. The prints are delivered completely dry, ready for immediate use.

Only twenty-five seconds is required to reproduce standard-size engineering drawings, account reports, file cards, photographic film positives, and other translucent originals. Original copy can be of any width up to 42 inches and of any length. The lines and images on originals can be reproduced in black, blue, red, sepia, or yellow on paper, cloth, foil, film, or plastic materials. Black-line paper, for example, can be used to exactly duplicate typewritten material, thereby obtaining prints that can be used as form letters with headings typed in on the prints themselves with the same typewriter as is used to prepare the translucent "master."

All together, fifteen types of Ozalid prints can be made on this new machine. It requires only 11 square feet of floor space.58

Ozalid "Streamliner" Positive Printing and Dry Developing Machine

Ozalid, Division of General Aniline and Film Corporation, Johnson City, N. Y., has brought out a new positive printing, dry developing machine designated the "Streamliner." This machine is designed to meet the printmaking requirements of business offices, drafting-rooms,

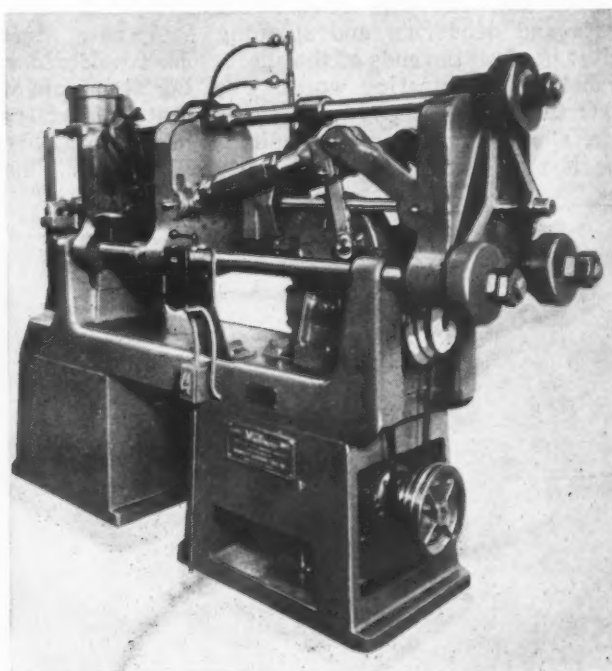
schools, colleges, and a variety of organizations requiring duplicate prints of typed, drawn, or printed copy. The Streamliner will make positive (not negative copies) of anything drawn, typed, printed or photographed on translucent material. No intermediate steps are re-

Automatic Die-Casting Machine

An improved model of its fully automatic high-speed, low-cost die-casting machine for the production of zinc, lead, and tin castings has been announced by Light Metal Machinery, Inc., 736 Penton Bldg., Cleveland, Ohio. Delays between cycles have been eliminated in this machine by a patented cycling mech-



Ozalid "Streamliner" Positive Printing and Dry Developing Machine

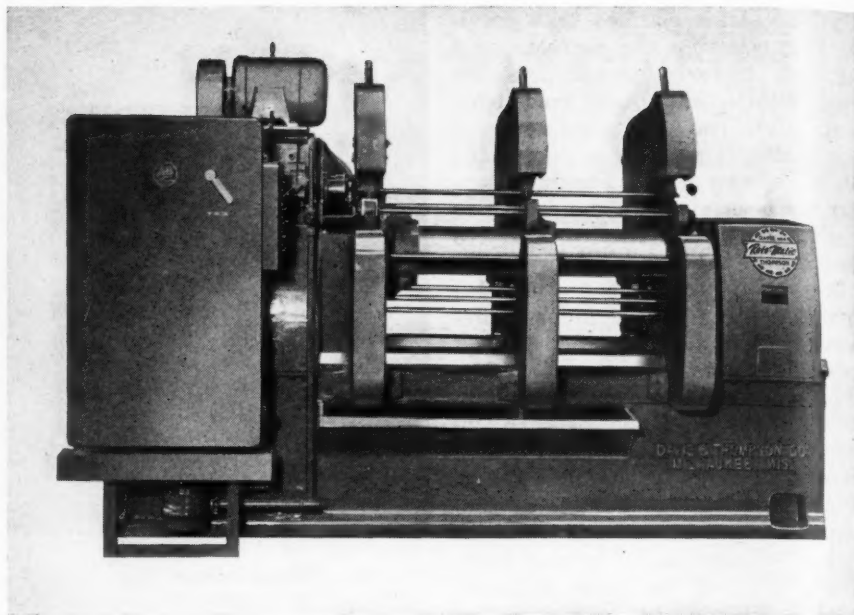


Automatic Die-casting Machine Brought out by Light Metal Machinery, Inc.

anism that provides for automatic die movement, injection of the molten metal, and ejection of the die-cast part in continuously repetitive cycles. Once the cycling rate has been selected and set, operator proficiency has no effect on the production rate, the operator merely filling the melting pot and lubricating the die. The machine can be operated at any one of four fixed speeds—240, 330, 520, and 720 shots per hour—to suit the size of the casting being produced.

The shot capacity of this machine is 16 ounces with a casting area of 30 square inches. Small 3/4-ounce castings can be produced from single-cavity dies at the rate of 720 shots per hour; larger 9 1/2-ounce castings are being run at 240 shots per hour with single-cavity dies; ribbed castings, such as padlock cases, weighing 1 1/4 ounces are produced from four-cavity dies at the rate of 520 shots per hour.

An average of fifteen minutes is required for making a complete change of dies and set-up, and the pressure pot assembly can be replaced in thirty minutes. Bolster-



Steering-shaft Milling and Spinning Machine Built by Davis & Thompson Co.

plate bearing sleeves can be replaced in less than one hour. The machine requires only 100 square feet of floor space. 59

it, and is readily adjustable for any desired tension.

After the machine has been fully loaded, each indexing movement of the fixture delivers a finished piece to the loading station, ready for removal and replacement by a rough piece. The heads of the machine are fed hydraulically, while all other functions are performed electrically. The machine is fully adjustable, equipped with various safety devices, and weighs 14,800 pounds. 60

Steering-Shaft Milling and Spinning Machine

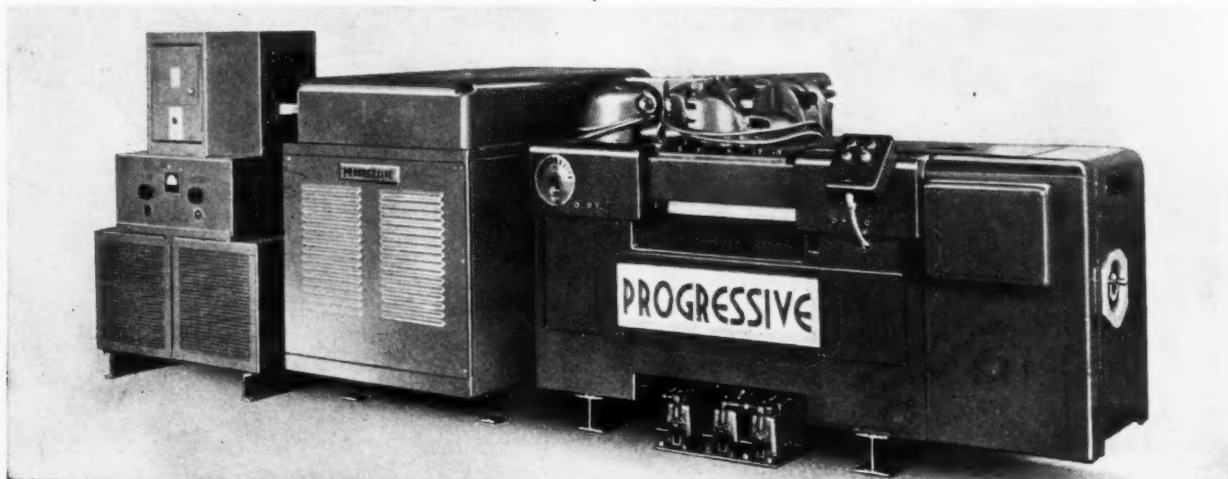
The Davis & Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis., has recently added to its line of special-purpose machine tools an index type machine for performing milling and spinning operations on steering shafts. The new machine has eight stations for rough- and finish-milling one end of steering shafts and deburring and spinning a rivet head on the ends of the shafts for holding the steering worm. The production rate is 300 pieces per hour. Chain clamping of the indirect type is employed to hold the work,

thus leaving the operator free to load and unload pieces as the stations pass his working position. This method of clamping insures positive holding of the work without marring

Flash Welder for Aluminum Operated by Storage Batteries

A new storage-battery powered flash welder designed for flash-welding aluminum was exhibited for the first time at the recent Metal Show in Atlantic City by the Progressive Welder Co., 3050 E. Outer Drive,

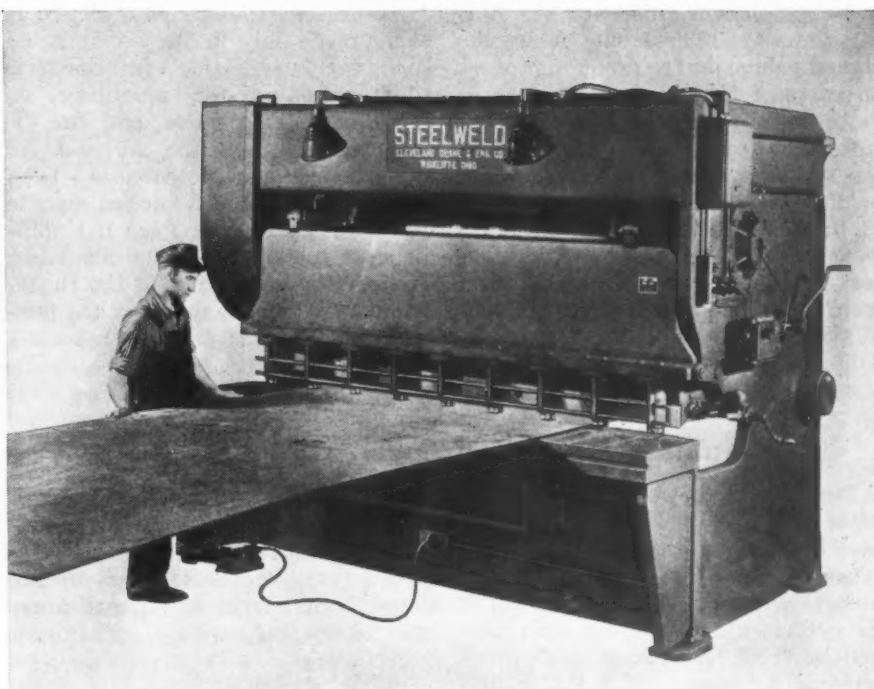
Detroit 12, Mich. The use of stored energy is employed with this equipment to provide the excessive power needed for welding aluminum. The machine is shown in the illustration, with the cam-operated flash-



Storage-battery Powered Flash Welder for Aluminum Developed by Progressive Welder Co.

welder unit at the right, the 16-cell 8-volt water-cooled battery power pack unit in the center, and the battery charger and charger control assembly at the left. The power pack is designed to supply up to 38,000 amperes.

The combined use of a Reeves variable drive, a Cone-Drive speed reducer, and a Fawick air clutch brake takes care of the high acceleration, high upset forces, and high deceleration required. In flash-welding aluminum, the speeds are five to twenty times as great as are employed for steel, since the flash-weld cycle is approximately 1/3 to 1 second, compared to 3 to 60 seconds for steel. The machine can be installed wherever adequate power is available to operate a 10- or 15-H.P., three-phase motor. 61



"Steelweld" Shears Equipped with New Type Electric Foot Control

Air Cylinders for Operating Work Holding and Handling Equipment

A new line of air cylinders designed to expedite the operation of work-holding devices for drilling, reaming, tapping, milling, and grinding, has been brought out by Air-Trol, 2651 W. Lake St., Chicago 12, Ill. These cylinders are also adapted for work injection and ejection mechanisms and for many other work-handling devices where the advantages of quick and easy actuation are important. They are equipped with oil-less graphite-impregnated bronze ram bushings. Sizes range from 1 1/2 inches up, and the power factor from 1.76 times the air line pressure. The cylinders are designed for single or multiple production line set-ups. Foot control, which leaves the operator's hands free, is available as supplementary equipment.62

Foot-Switch Control for "Steelweld" Shears

The control of "Steelweld" shears, built by the Cleveland Crane & Engineering Co., 1157 E. 283rd St., Wickliffe, Ohio, has been made extremely easy and convenient by a new type of electric foot control which has been adopted as standard for this line of machines. This device, consisting of a safety type switch connected to an outlet at the front of the machine by a heavy cable, controls the movement of the shear blade. The switch can be slid around the floor for use in the most convenient position.

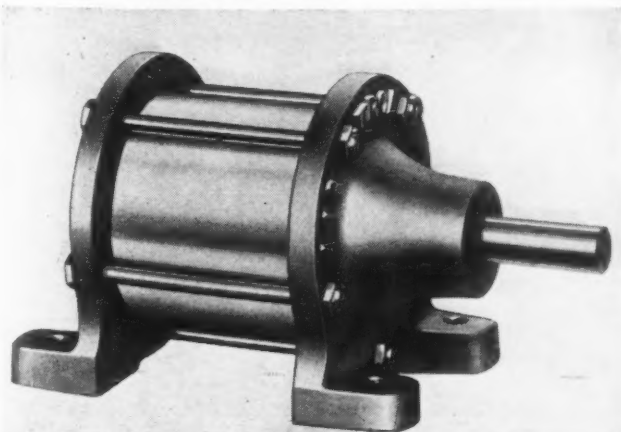
When shearing is done on a continuous production basis, the foot switch serves to reduce operator

fatigue, since it requires only a slight movement of the toe.

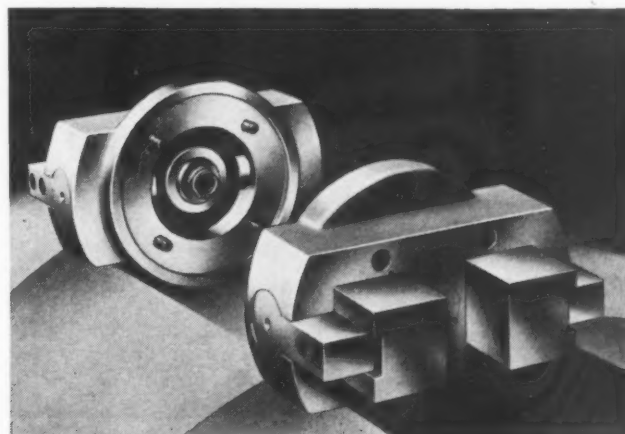
The electric control is especially advantageous when cutting long sheets which require the operator to be positioned several feet from the front of the machine. For example, when cutting quantities of narrow strips from long sheets of metal, the operator can push the sheet at the end and slide the switch along the floor as the sheet is advanced.63

Skinner Power Chuck for Odd-Shaped Pieces

The Skinner Chuck Co., 344 Church St., New Britain, Conn., has resumed the manufacture of its line of self-centering power-operated two-jaw



Air-Trol Cylinder for Operating Work Holding Equipment



Skinner Box-body Power Chuck for Odd-shaped Pieces

To obtain additional information on equipment described on this page, see lower part of page 212.

box-body chucks, discontinued during the war. These chucks are designed primarily for production work on parts of irregular shape, such as valve and pipe fittings. The special, soft jaws can be easily machined to the size and shape best adapted for holding the work. The center hole in the body of the chuck has a removable hardened ball-bearing liner for protecting the working parts from chips and for preventing wear of the center hole.

At present the box-body chuck is being made only in the 9-inch rated size for use with intermediate adapter plates for mounting on threaded spindle noses, and for direct mounting on the A6 and A8 sizes of the American Standard Type A-1, A-2, B-1 or B-2 flanged spindle noses. The cam-lock Type D-1 spindle nose mounting is also available. The maximum capacity of the chuck, as measured on the inside of the jaw-holding screws, is 4 1/2 inches.64

movement can be regulated, however, to a very slow squeezing action if desired. The ram pressure can be pre-set from a few pounds up to the maximum, and the stroke can be regulated from a few thousandths of an inch to 6 inches. The presses are especially suited for light push or pull broaching work, as well as for fast assembling, stamping, forming, riveting, punching, cutting, and other punch-press operations. Either hand-lever, foot-pedal, or push-button (solenoid) control can be employed. The presses occupy very little bench space, being approximately 35 inches high, 22 inches from front to back, and 10 inches wide. The clear space from platen to ram when fully retracted is 11 1/2 inches, and the throat depth is from 8 to 9 1/4 inches. The presses can also be made to special dimensioned specifications. 65

Studebaker Air-Powered Arbor Presses

Two new air-powered arbor presses of all steel welded construction have been brought out by the Studebaker Machine Co., 1221 S. Ninth Ave., Maywood, Ill. Double-acting air cylinders are used on both new models. The "Hurricane Six" press develops a pressure of 1 ton on the down stroke at an air-line pressure of 80 pounds, and a pressure of 1 ton on the up stroke. At 120 pounds air-line pressure, this press develops a ram pressure of 1 1/2 tons on both the downward and upward strokes. The "Hurricane Eight" develops a 2-ton ram pressure on the down and up strokes at an air-line pressure of 80 pounds, and a 3-ton

ram pressure at an air-line pressure of 120 pounds per square inch.

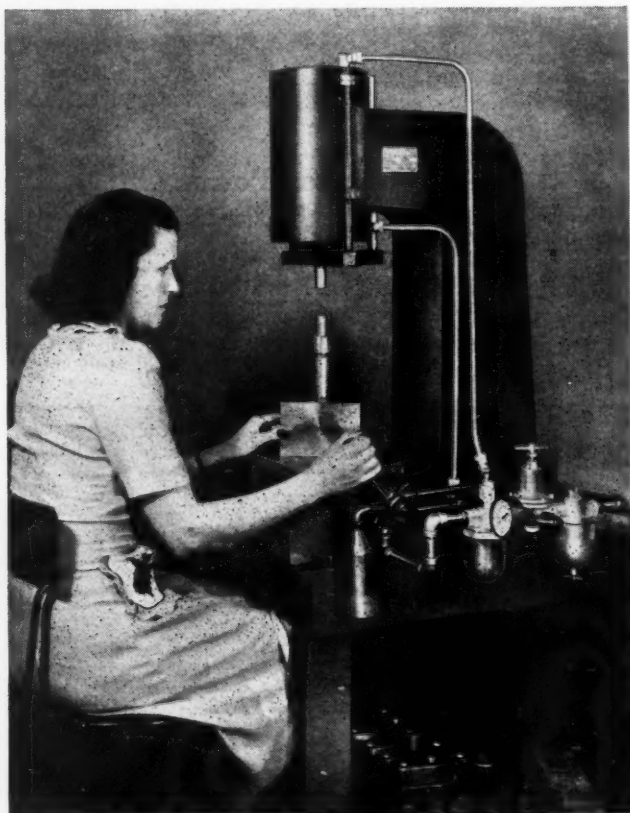
These air-actuated presses are designed for exceptionally fast operation, giving up to 200 punch-press ram blows per minute. The ram

Fray "All-Angle" Vertical Milling Attachment

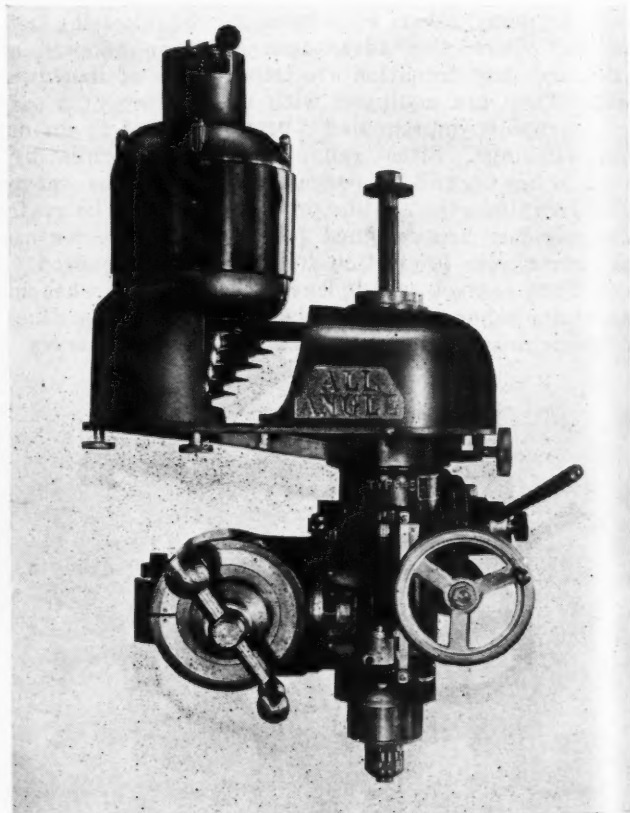
The H. Leach Machinery Co., Providence, R. I., exclusive national distributor for the Fray Machine Tool Co., Glendale, Calif., has recently announced several important improvements in the Fray "All-Angle" vertical milling attachments. These attachments are now being

manufactured in four types, each incorporating distinctive features. The improved Type 1 attachment is equipped with a 3/4-H.P. heavy-duty motor instead of the 1/2-H.P. motor previously used.

The Types 1, 2, and 3 attachments retain the present wide range of



"Hurricane Six" Air-powered Arbor Press Brought out by the Studebaker Machine Co.



Fray "All-Angle" Vertical Milling Attachment Announced by the H. Leach Machinery Co.

spindle speeds—375 to 5200 R.P.M. Type 3 will be available with an exclusive patented back-gearing feature which provides two additional low speeds of 125 and 250 R.P.M.

The Type 4 "All Angle" milling attachment is a heavier unit designed for use on No. 2 and heavier milling machines, engine lathes, planers, boring mills, etc. This attachment, which was previously supplied with a 1-H.P. motor, is now equipped with a heavy-duty 1 1/2-H.P. motor. Also it has been redesigned to take a No. 30 National Standard taper. The speed range has been changed to include six open belt spindle speeds from 375 to 5200 R.P.M., and in addition is equipped with two back-gear speeds of 125 and 250 R.P.M. A complete line of standard adapters is available for various sizes of over-arms, and special adapters can be obtained to suit the user's specifications. 66

Sip Jig Borer

The Cosa Corporation, Chrysler Bldg., New York 17, N. Y., representative for Societe Genevoise d'Instruments de Physique, Geneva, Switzerland, has just announced the

development of a new jig borer designated Type MP-2H. This machine has a table working surface of 27 1/2 by 12 1/2 inches, and has been developed to perform the finest precision type of work, all settings of the table being guaranteed to an accuracy of 0.00015 inch.

The measuring system of this machine comprises two standard scales incorporated in the table slides which are viewed by built-in micrometer microscopes reading to 0.0001 inch. The entire measuring system is totally enclosed, and is free from any mechanical strain.67

Drum Type High-Speed Miller

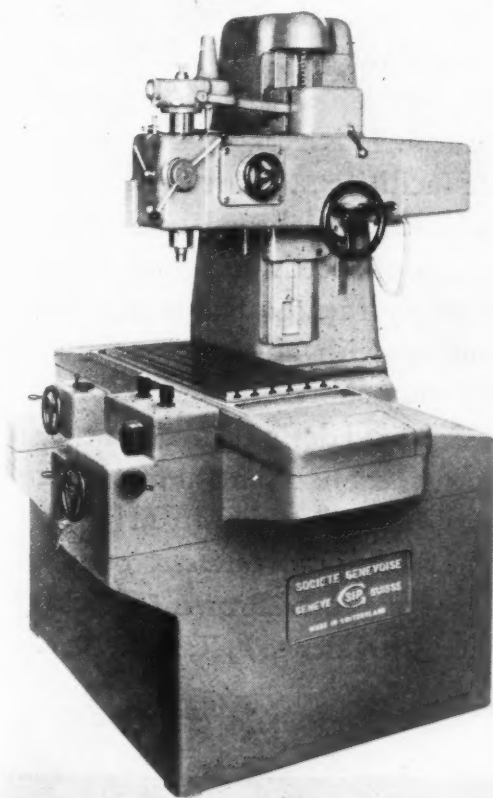
A "Craftsman" drum type milling machine designed for the single- or double-milling of four pieces simultaneously has been developed by the Sommer & Adams Co., 18515 Euclid Ave., Cleveland 12, Ohio, to speed up the production of studs, nuts, bolts, pins, strips, etc. This machine is adapted for straddle-milling, slotting, or facing, and is equipped with multiple milling-cutter mountings to obtain high production rates. Other features include a quick-loading chuck, automatic ejection of finished work, and easy access to cutters for adjustment or regrinding.

The drum-rotating gear-box is mounted in the center of the frame, and consists of a worm and worm-wheel driven by a hardened and ground worm and tractor bronze worm-gear, with pick-off gears for

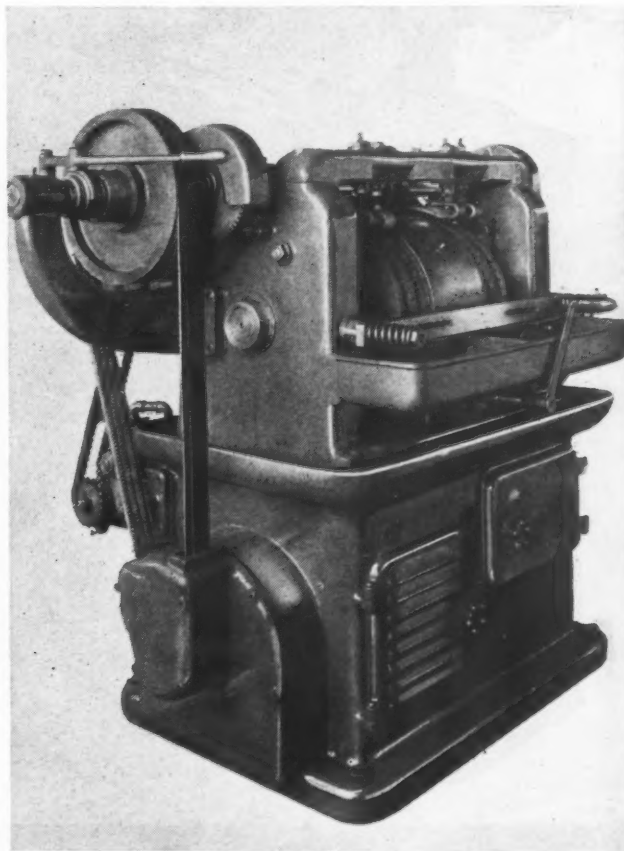
changing the rotational speed of the drum. The spindle drive V-belt pulley has a disk type clutch for disengaging rotation of the cutters, spindles, and drum. The cutter-spindle overhead arms are of the swing type, which facilitates removal of the cutters.68

Electrode for Automatic Welding

The Hollup Corporation, Division of National Cylinder Gas Co., 4700 W. Nineteenth St., Chicago 50, Ill., has developed a new type of electrode called the "Shield-O-Matic," for use in automatic welding operations. This electrode has been designed to combine all the materials necessary for producing a crucible-enclosed



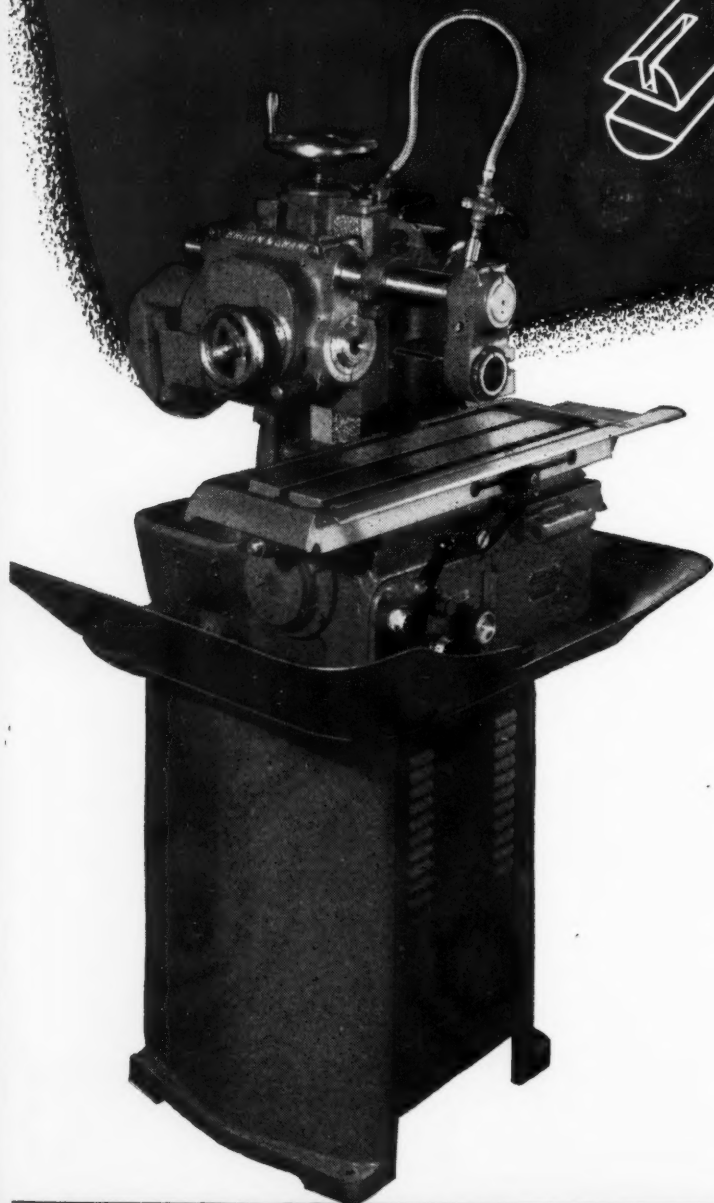
Sip Jig Borer with Built-in Micrometer Microscopes for Precision Table Setting



Drum Type High-speed Miller Developed by the Sommer & Adams Co.

To obtain additional information on equipment described on this page, see lower part of page 212.

3 SMALL MILLING JOBS WHERE THE No. 000 SHOWS REAL SAVINGS



Here's another demonstration of how the speed, flexibility and easy handling of the No. 000 help to make the milling of small pieces more economical. This calls for a combination of facilities . . . fast easy set-up and adjustment – broad, independent ranges of speeds and feeds – and exceedingly rapid automatic table movements with ability to set trip dog for very short cuts and accurate reversal. Sound design and characteristic Brown & Sharpe manufacturing make the No. 000 Plain Milling Machine a safe investment over a long term of years. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



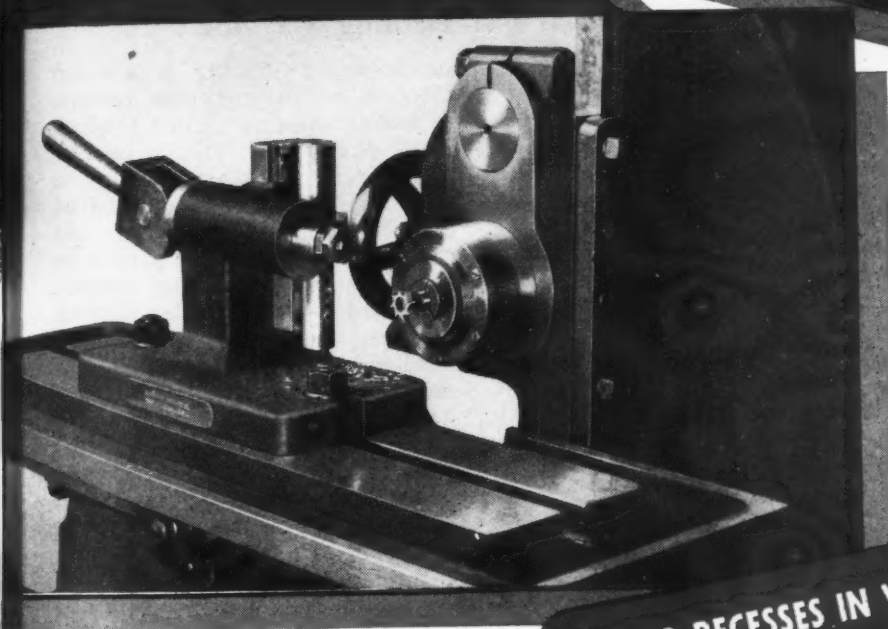
BROWN

&

Milling slot with contour at bottom in brass fuze component. This is accomplished with a special tilting table fixture, the roll of which rides on the formed guide attached to the machine bed. The quick-acting clamp and the rapidity of table movement on the No. 000 completes this cut at an exceptionally fast rate. Cutting time is 35% of the cycle at $20\frac{1}{8}$ in. per min. feed rate.



MILLING WOODRUFF KEY SLOT



Milling Woodruff key slot in a cast Meehanite shaft. This simple fixture locates and supports the piece, held by a cam-operated clamp. Uniformity of key slot depth is assured by the accurate table reversal of the No. 000. Cutting time, 48% of cycle; feed, $2\frac{11}{16}$ in. per min.

Milling two recesses in cast iron valve plate. Both cuts are completed with one clamping of the work because the trunnion-type fixture is manually indexed from one position to the other on successive movements of the table. Depth of cut is held to close limits by the No. 000's accurate table reversal. Total cutting time 29% of cycle. Feed rate is $6\frac{11}{16}$ in. per min.



SHARPE

IBS

welding arc and to combine the advantages of the manual shielded arc-welding process with those of continuous automatic welding.

A metallic grid construction that binds the heavy flux coating to the wire core enables the electrode to withstand extreme flexing and bending without loss of flux and permits it to be fed continuously into the mechanically maintained arc from a reel. Unusually high welding currents can be conducted through the heavy coating of flux to the inner steel core by the grid, which extends to the periphery of the electrode...69



Sonntag Torsion Testing Machine for Wire

tion, are available with a maximum torque of 1000 inch-pounds. Stresses up to 80,000 pounds per square inch can be obtained on 1/2-inch spe-

cimens. The specimen can be preloaded in tension, and a reset type counter is automatically disengaged when the specimen fails.70

Sonntag Torsion Testing Machine for Wire

A new torsion testing machine for wire, developed recently by the Sonntag Scientific Corporation, is being placed on the market by the Baldwin Locomotive Works, Philadelphia 42, Pa., who have exclusive sales rights for this product. The machine will test bronze and copper trolley wire, telephone and telegraph wire, and steel tie wire from 0.090 to 3/4 inch in diameter in accordance with ASTM specifications.

Three twisting speeds of 10, 20, and 30 R.P.M., with reversible rota-

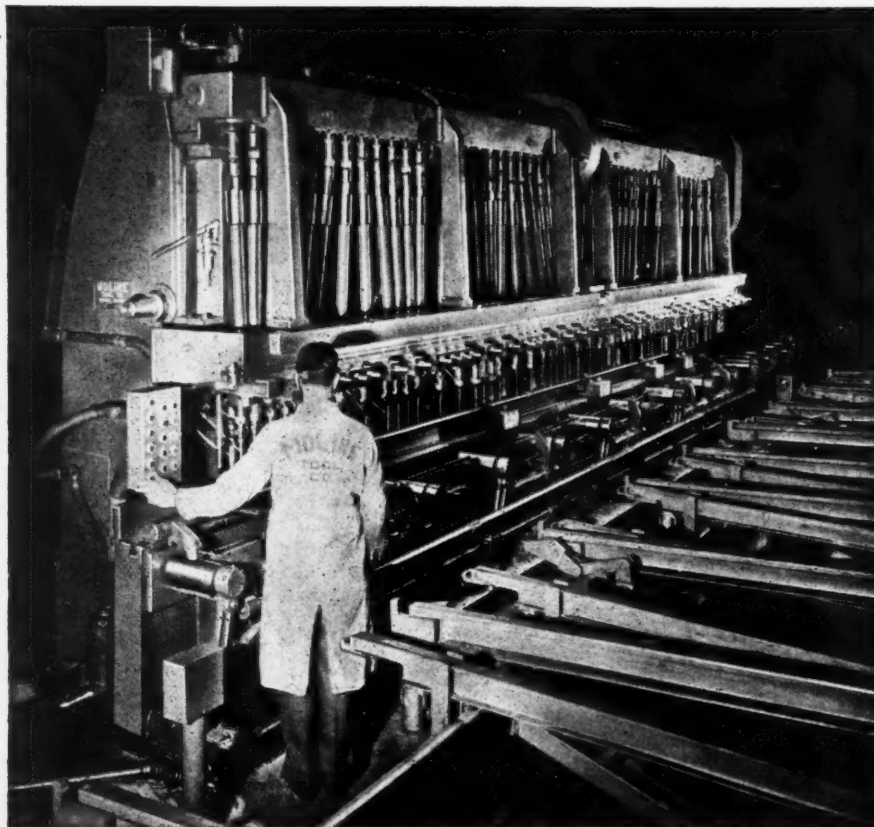
Moline Special Rail-Drilling Machine

A forty-spindle machine for drilling railroad rail sections as heavy as 131 pounds and up to 39 feet long has been brought out by the Moline Tool Co., 107 Twentieth St., Moline, Ill. Each spindle unit has a 2-inch adjustment at right angles to the spindle center line to obtain the settings required for drilling rail sections for switch points and similar railroad track components. Reinforcing bars are also drilled in their respective assembled positions. Thirty-eight of the spindles have

capacities for drilling 1 5/8-inch holes on 4-inch minimum centers, and two spindles will drill 1 1/4-inch holes on 2 1/2-inch minimum centers.

The loading mechanism with a rack on which the parts to be drilled are grouped is located at the front of the machine. After the parts have been placed on the loading mechanism, the conveying arms lay them on the power rolls, where they are positioned endwise by positive stops. The work supports of the fixture then raise the parts into the drilling position, where they are gripped by horizontal clamps. The drills advance at a rapid traverse rate while vertical spring-actuated clamps hold the work in place. After the drills have been fed through the work, they are withdrawn at a rapid traverse rate and the vertical spring clamps automatically release the work. The horizontal clamps are next released and the work lowered onto the power rolls, which run it out onto the receiving table at the right-hand end of the machine.

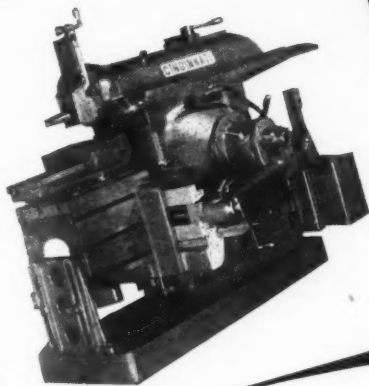
An electric push-button station at each end of the machine provides a dual set of controls for all functions of the machine and fixture. Safety interlocking devices insure performing the various functions in their proper sequence. A photo-electric safety device instantly immobilizes the work conveying arms in case anyone walks between the machine and loading mechanism. Another safety device consists of a knee-high horizontal bar running along the front side of the machine for its entire length, which stops all movements of the machine when moved back only a fraction of an inch. The weight of the machine, including loading mechanism and receiving table, is about 112,000 pounds.71



Railroad Rail Drilling Machine Built by Moline Tool Co.

ACCURACY FIRST...

Courtesy of
Sheffield Corporation
Dayton, Ohio



Accuracy is the first requirement where fine tools and gauges are built—their whole value lies in their accuracy.

In their production fine machines are needed for only fine machines can produce fine tools.

Cincinnati Shapers are found where jobs are most exacting—they are built to close tolerances, have reserve power and rigidity, and their smooth performance meets the demand for accuracy.

Write for Complete Catalog N-3.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES



Tocco Induction Heating Equipment

The Tocco Division of the Ohio Crankshaft Co., Cleveland, Ohio, has announced four important new developments in induction heating equipment—the Tocco “Heat Gun,” shown in Fig. 1; a 30,000-cycle motor-generator type of induction heating unit; a new variable-ratio transformer; and the 7 1/2-kilowatt output, 3-mega-cycle induction heating unit illustrated in Fig. 2.

The Heat Gun is a portable inductor which permits bringing the heat to the work. It is particularly adapted for large, cumbersome assemblies where many spot-heats are required, and for short-run production jobs. The gun can be used with flexible leads 20 or more feet long, and is controlled by a simple trigger switch. It is built for operation with the standard 10,000-cycle motor-generator type induction heating unit.

The 30,000-cycle Tocco machine triples the previous high-frequency limit of motor-generator type induc-



Fig. 1. Tocco “Heat Gun” Brought out by the Ohio Crankshaft Co.

tion heating equipment. Although the previous maximum frequency of 10,000 cycles has been generally

satisfactory for surface hardening parts over 3/8 inch in diameter, the 30,000-cycle set enlarges the range of this type of equipment to include effective surface hardening of even smaller parts.

The new variable-ratio transformer is designed to increase the adaptability of motor-generator type induction heating equipment. It can be made to match any size load and any size inductive coil by a simple change of leads.

The 7 1/2-kilowatt output “Toccotron” unit is an electronic type of induction heating unit and operates at about 3 megacycles. It is designed to increase efficiency in heating parts of very small diameter or thin strip stock...72

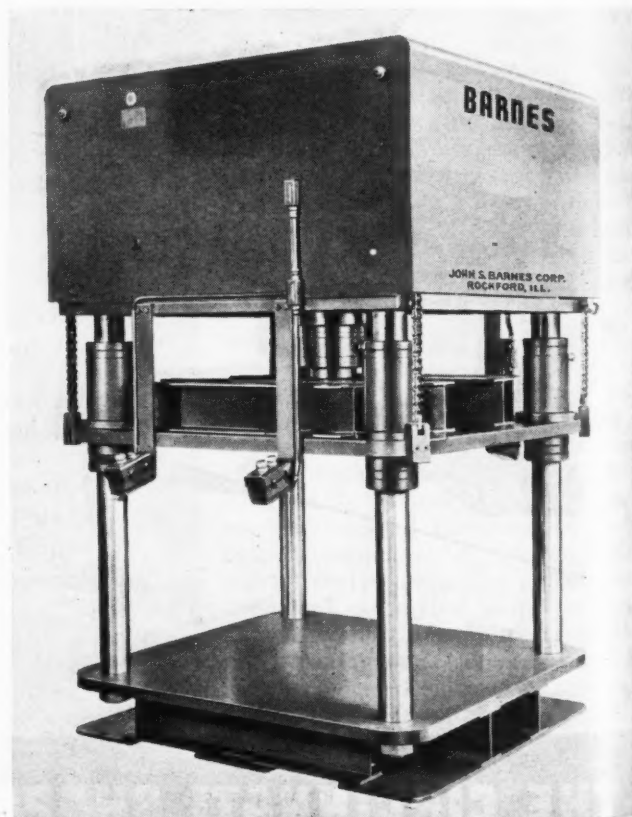
Barnes Hydraulic Press

Two new hydraulic presses of 25- and 50-ton capacities, developed for the high-speed handling of sheet-metal fabrication work, have recently been added to the line of hydraulic metal-working equipment built by

the John S. Barnes Corporation, 147 Walnut St., Rockford, Ill. These machines have been designed to combine the functions of several presses in one compact unit for the piercing, punching, forming, and drawing of

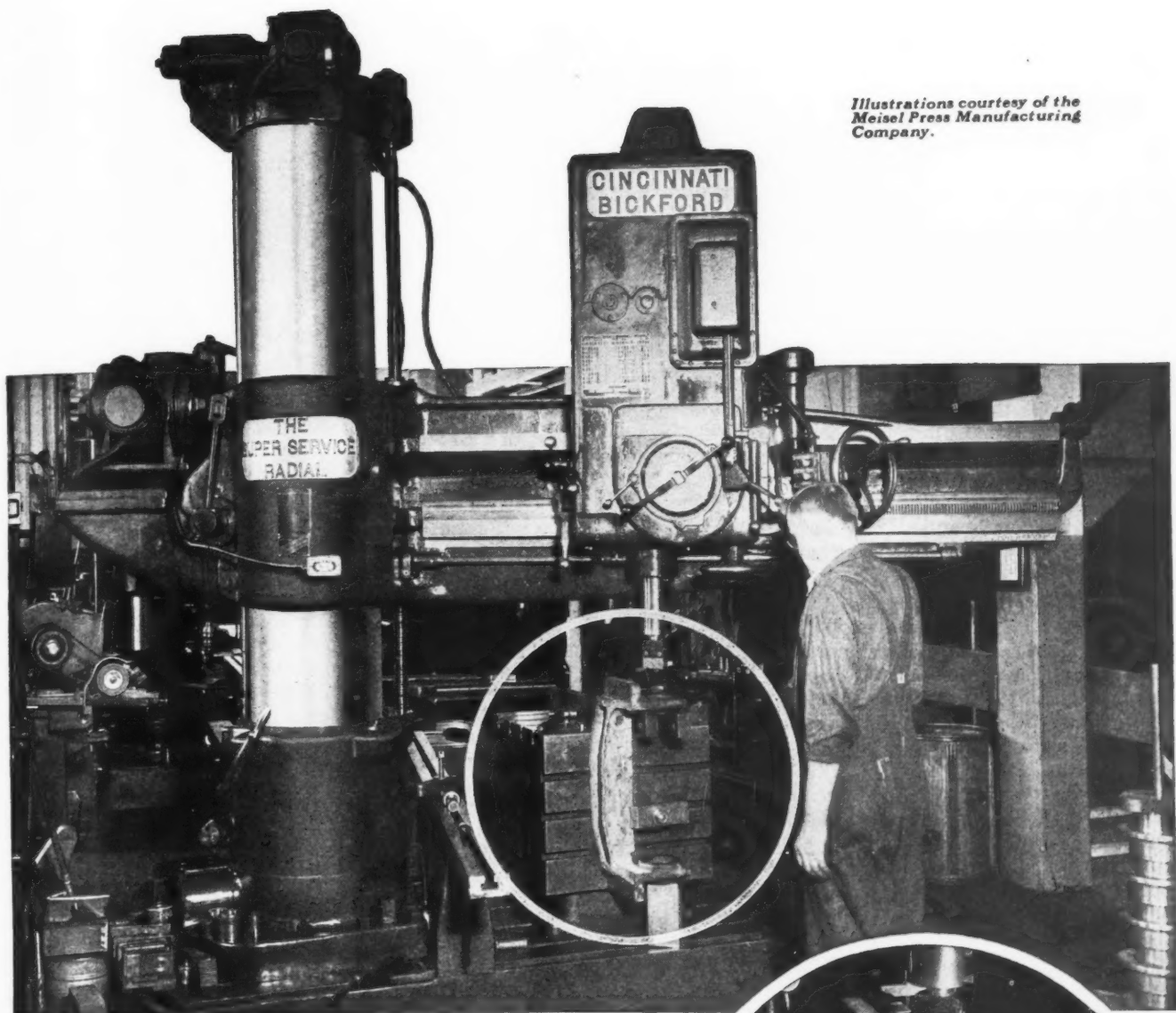


Fig. 2. “Toccotron” Electronic Type Induction-heating Unit for Parts of Very Small Diameter



Barnes Hydraulic Press for Piercing, Punching, Forming, and Drawing Sheet-metal Parts

Illustrations courtesy of the
Meisel Press Manufacturing
Company.



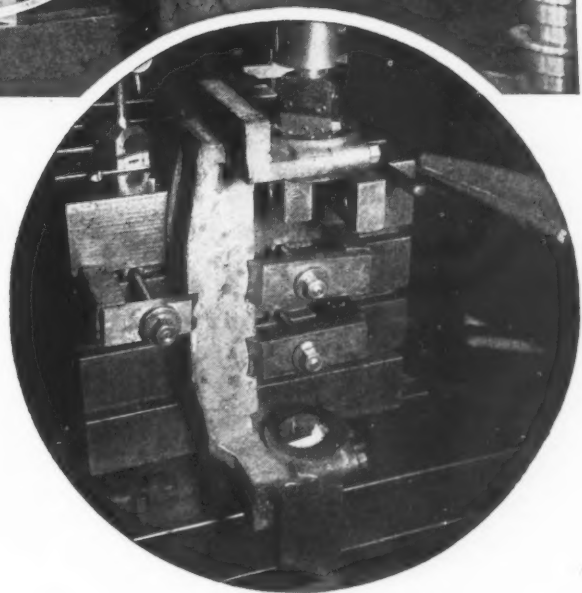
LIMITS WERE CLOSE!

Boring and reaming the main bearings of a cutting cylinder to .0005 limits with a Cincinnati Bickford Super Service Radial Drill has effected a 20% saving over previous machines at the Meisel Press Manufacturing Company, Boston, Massachusetts.

The accuracy of Cincinnati Bickford Super Service Radial Drills, and their ease of handling, made this worthwhile saving possible in small lot production.

Write for detailed Bulletin R-24A.

See our condensed Catalog in Sweet's File.



*Equal Efficiency of Every Unit
Makes the Balanced Machine*

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

MACHINERY, December, 1946—195

sheet-metal parts. This combination of functions in one machine makes possible the completion of a part with less handling of the work and with substantial reductions in production costs. Thus the new machine has the advantage of increasing production rates and requiring only one or two men for its operation, depending upon the character of the work and the production requirements.

New operating methods developed to give greater accuracy are said to reduce the number of rejected parts. Extreme flexibility of adjustment is also said to reduce "down" time. Each press is driven by a Barnes self-contained hydraulic unit to insure smooth operation, which is constantly under finger tip control. Dual electric controls increase flexibility and provide safer operation.73

Waltham Pinion- and Gear-Cutting Machine

A precision machine for cutting straight-tooth pinions and gears up to 2 1/4-inch pitch diameter with a single revolving cutter, which makes successive cuts on blanks held and indexed by the work-spindle and supported by a tail-center, has been added to the line of the Waltham Machine Works, Newton St., Waltham, Mass. The machine will take cuts up to 2 inches in length. It is intended to serve as an intermediate size between machines having a capacity for gears 4 inches in diameter and those designed to cut gears up to 1 1/2 inches or pinions up to 1/2 inch in diameter. Operation is automatic from the time the first cut is started to the completion of the last cut. The machine stops with the cutter lifted clear of the work, thus permitting easy and quick loading and unloading.

A pump delivers coolant directly to the work at the cutting point. The motor is connected to a shaft that drives the cutter-spindle, coolant pump, and indexing mechanism by means of endless V-belts. This shaft also drives the camshaft through a worm and gear.

The standard work-slide cam allows

a stroke adjustment of from 1.4 to 2.4 inches. A cam with a shorter throw can be furnished for use in cutting pinions. In changing cams, only the outer bearing support need be removed. Unless otherwise specified a 120 division index is furnished with the machine. With this index and an adjustment of the indexing mechanism, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, or 120 divisions can be obtained. Other division indexes are also obtainable. The cutters regularly used are 1 inch in diameter with a 3/8-inch spindle hole, but arbors for cutters of other diameters can be supplied if necessary.74

Ruthman Motor-Driven Pump

A new ball-bearing motor-driven pump is being placed on the market by the Ruthman Machinery Co., 1807-1823 Reading Road, Cincinnati 2, Ohio, which is capable of handling 70 gallons of liquid per minute at a total head of 22 feet. The 3/4-H.P. motor with which the pump is equipped operates at a speed of 1725 R.P.M. This pump, known as the

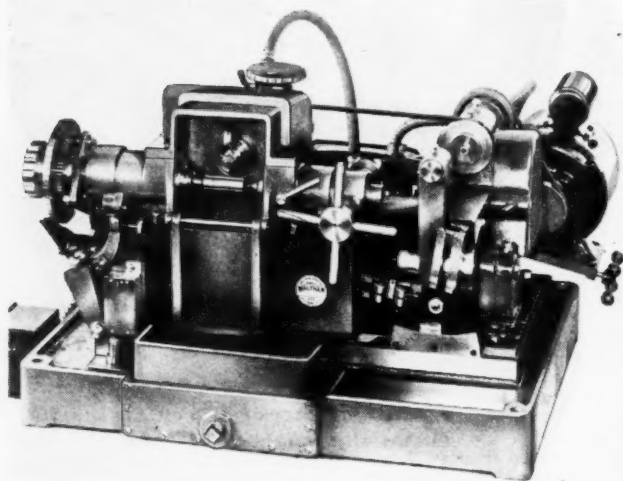


Motor-driven Pump Made by Ruthman Machinery Co.

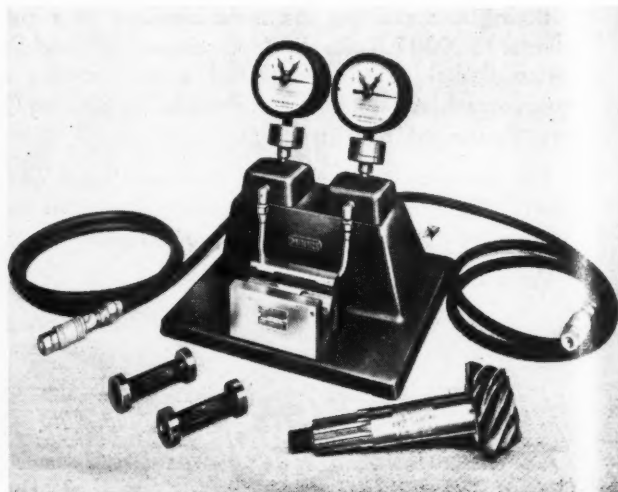
"Rumac" can be installed either below or above the reservoir and in either a horizontal or a vertical position. When desired it can be converted to a pipe inlet type by the use of a pipe adapter plate. Similar models will be available with driving motors from 1/4 to 2 H.P.75

V-Block Unit for Moore Pneumatic Comparator Gage

The Moore Products Co., H and Lycoming Sts., Philadelphia 24, Pa., has developed a new V-block type of air-gaging unit for the Moore pneumatic comparator gage. This unit can be supplied for the simultaneous measurement of one, two, or more outside diameters as small as 0.150 inch or as large as 8 inches. The instrument illustrated is equipped to measure two diameters on a pinion



Precision Pinion- and Gear-cutting Machine Built by Waltham Machine Works



Moore Pneumatic Comparator Gage Equipped with V-block Air-gaging Unit

*What's
Ahead*
for
your business?

EX-CELL-O

**PRODUCTION
PARTS**

*... for New
and Improved
Products*

**Check Ex-Cell-O's
Capacity for the
Mass Production
of Precision Parts**

With a complete organization under one responsible management . . . an organization built upon years of varied engineering experience, modern machining methods and heat treat facilities, and practical inspection staffs . . . Ex-Cell-O probably has the

exact solution to the parts production problem you face. The above folder illustrating Ex-Cell-O's complete parts production facilities will be sent you upon request. Write or wire Ex-Cell-O today and ask for Ex-Cell-O Bulletin No. 36151.

XLO

EX-CELL-O for PRECISION

EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

Send sketch,
blueprint or
sample of your
part to Ex-Cell-O

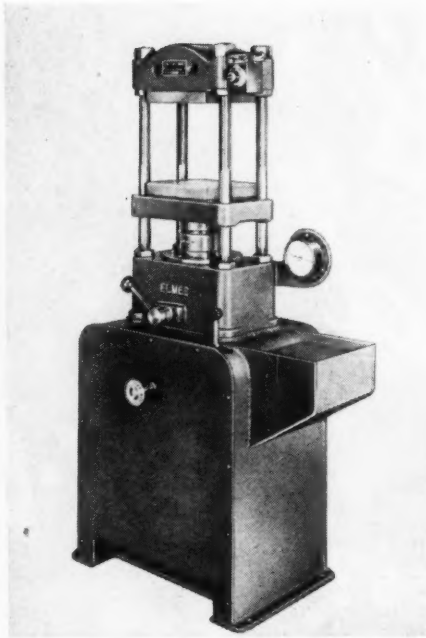
shaft, and is used by a leading automobile manufacturer for selecting parts to an accuracy of 0.00005 inch.

The part gaged can be checked for out-of-roundness by rotating it in the V-block. It can also be checked for taper by simply sliding it axially along the V-block. The maximum and minimum masters by which the gage is set are shown in the foreground of the illustration. Since the weight of the part gaged is carried on tungsten-carbide strips, the V-block type unit is practically unaffected by wear. The nozzles that perform the measuring are recessed below the surface, and the gage is so designed that chips, oil, and coolant have no effect on the accuracy of the measurements. The gage can therefore be installed right at the grinding machine.76

Elmes Hydraulic Press

A new line of high-production, fully power-operated hydraulic presses that have neither motor nor pump has just been announced by the Elmes Engineering Works of American Steel Foundries, 1002 Fulton St., Chicago 7, Ill. Compressed air from the shop air-pressure line introduced above the liquid by a simplified control provides the power for rapid closing and instantaneous application of full pressure. Any desired pressure within the capacity of the press can be applied and maintained until the control is reset. The new hydraulic principle is said to offer greater economies in the molding of plastics and rubber; assembly forcing; straightening; and testing.

The new presses are of simple design and require a very small amount of air for their operation. They are



Elmes Power-operated Hydraulic Press

made in 20- and 30-ton bench and floor type models, and in a 50-ton floor type. The 30-ton floor type press illustrated has a 6-inch stroke and an opening which is adjustable from 0 to 13 inches, and can be equipped with 10- by 10-inch hot plates. It has a height of 65 inches, weighs 1325 pounds, and requires a floor space of 37 by 19 inches.....77

Uniform Surface Illuminator for Wilder Projector

The George Scherr Co., Inc., 199 Lafayette St., New York 12, N. Y., has announced the development of an entirely new type of reflector or surface illuminator for reflected image

projection designed to be used on the Wilder projector. This new illuminator has a ring of eight low-voltage bulbs mounted in an extremely compact circular lamp housing which completely surrounds the projector lens. The high-intensity light is directed vertically against the surface of the work, and is said to insure a truly uniform, shadow-free illumination over the full area of the lens and screen.

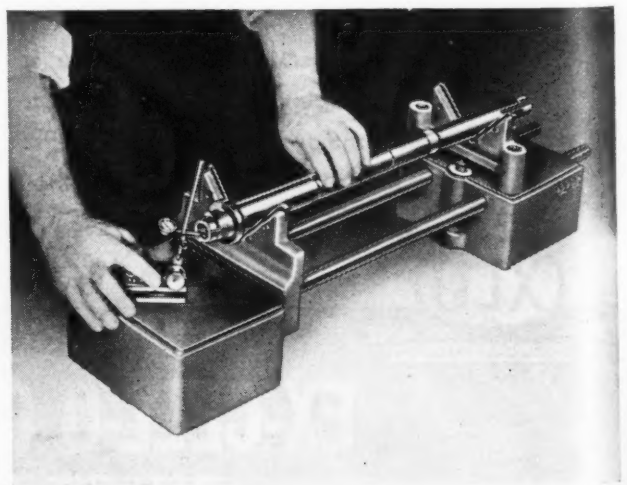
The surface illuminator is instantly removable from the lens of the Wilder Microprojector, shown in the accompanying illustration, although it can be left in position without interfering with the regular projection in transmitted light inspection work. In fact, if desired, the image can be produced jointly in transmitted and reflected light. In order to make the surface illuminator fully self-contained and applicable to instruments now in use, it is operated through a separate constant-voltage transformer.78

Swanson "V-Liner" for Checking Concentricity of Machine Parts

Checking and inspecting relative concentricities of round parts or sections by the conventional method of using V-blocks in conjunction with gage-blocks, planer gages, and other aligning tools can now be accomplished quicker and with less effort on an instrument known as the "V-liner," recently brought out by Swanson Tool & Machine Products, Inc., 814 E. 8th St., Erie, Pa. This new instrument also eliminates the complicated and lengthy mathematical computations previously required.



Uniform Surface Illuminator for Wilder Projector
Announced by the George Scherr Co., Inc.



Swanson "V-Liner" Set up for Checking Concentricity of Bores and Outside Diameters of Shafts

**UP TO 80% OF YOUR TURNING,
FACING, AND BORING JOBS HANDLED BY**



THESE 11 STANDARD CARBOLOY TOOLS!

Reduces Inventory of "Specials" —Permits Fast Tool-Up

With these 11 Carboloy Cemented Carbide "Standards" in stock, you're prepared to handle up to 80% of your turning, facing, and boring jobs. No need to stock a big inventory of special tools—just grind "Standards" to desired shapes and you're ready to tool up fast! "Standards" stay on the job longer—hold their cutting edge longer—maintain close tolerances—yield a high output per tool—and produce a fine surface finish.

Stocked Locally For Immediate Delivery —Surprisingly Low Prices!

Carboloy "Standards" are stocked in quantity in 70 cities, coast-to-coast—making possible speedy delivery. By this service you avoid excessive delays, lost time, interrupted schedules. Moreover, these superior cutting tools are *actually priced lower than ordinary tools, in many sizes!* For complete data and specifications on all tools, write for Catalog GT-175R—sent to you without cost or obligation.

CARBOLOY COMPANY, INC.

11147 E. 8 Mile Street, Detroit 32, Michigan

CHICAGO • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES • MILWAUKEE
NEWARK • PHILADELPHIA • PITTSBURGH • THOMASTON, CONN.

**Stock up
NOW on**

Standard CARBOLOY TOOLS
(TRADEMARK) CEMENTED CARBIDES

STOCKED BY



IN 70 CITIES
Coast To Coast

The "V-liner" instrument automatically determines the correct center-line heights required for any combination of diameters involved in checking the work.

The instrument consists of two V-blocks mounted on solid members which are held in accurate alignment by cylindrical rods. These hardened and ground aligning rods are pressed into the first V-block member and permit the second V-block member equipped with an elevating V-block to be adjusted as desired. Both V-blocks have replaceable hardened and ground tool-steel wear resisting edges. The hardened adjusting screw which raises and lowers the movable V-block on the guide pins is accurately calibrated and compensated.

Simply setting the adjusting screw of the V-liner in accordance with the graduations corresponding to the

difference between the diameters or dimensions to be checked serves to accurately position the part in the horizontal plane for the checking operation. The gage insures rapid and positive checking of the concentricity of bores, counterbores, and outside diameters of shafts and a variety of cylindrical parts.

It also provides a means for finish-inspecting precision cylindrical parts, and can be used for positioning and holding cylindrical parts for light milling, drilling, and surface grinding operations. The V-liner is now available in the Model A size for handling work varying from 1/4 inch to 6 inches in diameter and from 1 inch to 24 inches in length. Models with the same diameter range are also available for handling parts up to 36 and 48 inches in length.79

Spitfire High-Speed Precision Flat Lapping Machine

A new machine built for highly accurate flat lapping operations on both large and small surfaces has been brought out by Spitfire Tools, Inc., 2933 Pulaski Road, Chicago 41, Ill. This machine is adapted for the rapid production of accurate flat metal surfaces such as are required for rotating parts, gages, air- and liquid-tight seals, plastic molds,

drawing dies, and pressure pads. It can also be used for lapping glass, quartz, and any other material where an extremely accurate flat surface is important.

With this machine, it is possible to obtain a surface finish as fine as 2 r.m.s. micro-inches. Single pieces ordinarily require no holders, chucks, or collets, the operator simply holding the piece on the revolving lapping plate and directing its motion with his hands. Production lapping of large quantities of small parts can be rapidly accomplished by using standard or special holders. The lapping plate is 18 inches in diameter, and the stand model requires a floor space of 19 by 19 inches. Either a 1/3- or a 1/2-H.P. motor is recommended for use with this machine. The weight of the machine is approximately 390 pounds.80



Spitfire Precision Lapping Machine

Airco Electrodes for Automatic Welding

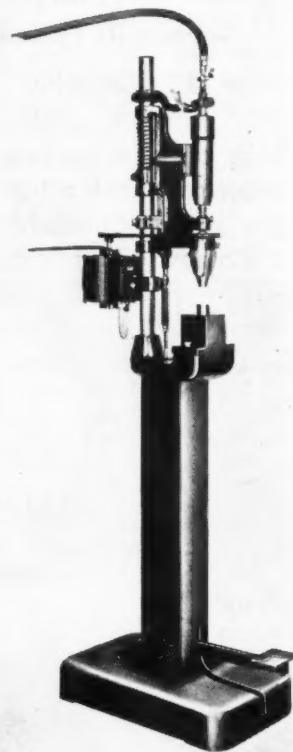
To supplement its "Airco" brand of electrodes used for manual welding, the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., has brought out a group of arc-welding wires and tapes developed especially for automatic arc-welding. This new line embraces five knurled type wires and five tapes, all for flat-position operation, and all recommended for low-cost uniform automatic welding. Their applications on the production line range from thin-gage sheet-metal forms to boilers, axle housings, and torque tubes.

These wire and tape electrodes are manufactured in several diameters, and are designed to meet the general requirements of high-speed production welding. The wires can be used separately or in conjunction with the tapes, depending upon the nature of the welding job.81

Improved "Pneu-Spin" Riveter

A "Pneu-Spin" riveter of improved design, adapted for assembling metal, wood fiber, porcelain, plastic, and die-cast products, has been brought out by the Schlack Mfg. Co., 13255 Birwood Ave., Detroit 4, Mich. Four interchangeable heads are available with this machine which have capacities for riveting 3/32-, 5/32-, 1/4-, and 5/16-inch soft steel rivets. When operating at 75 to 80 pounds air pressure, the riveting heads impart 4000 to 6000 short-stroke blows per minute to the rotating spindle and peening tool. The force and frequency of the blows can be controlled through an air valve.

Peening tools attached to the tapered end of the spindle can be used for forming round, oval, and flat heads; peening shafts, pins, and studs; flaring small tubes and brass

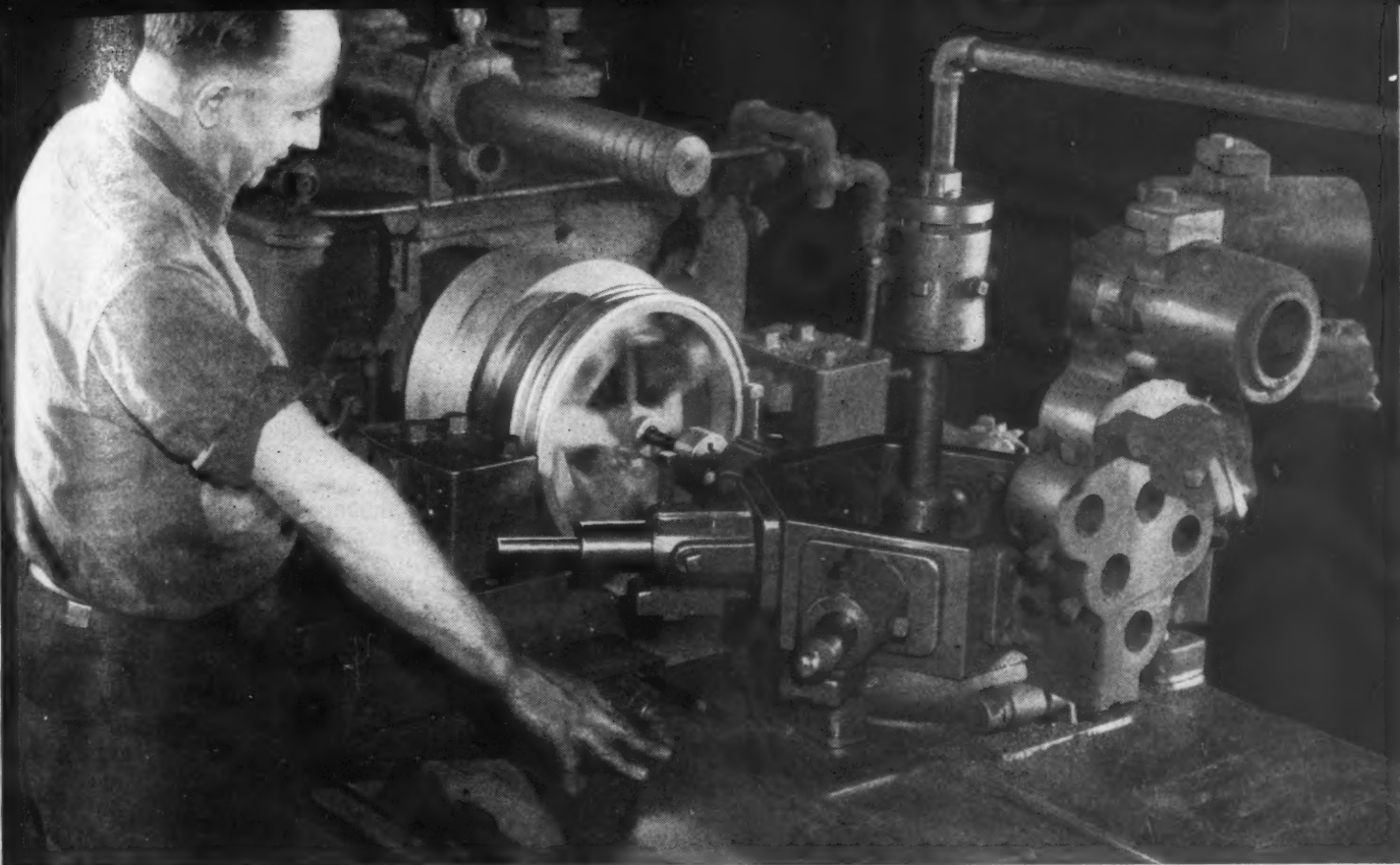


"Pneu-Spin" Riveter

s are
ters,
neral
duc-
used
n the
re of
...81

im-
sem-
lain,
has
lack
De-
able
ma-
ivet-
inch
g at
the
3000
the
tool.
lows
air

tap-
used
flat
and
rass



Production Trebled when the **FASTERMATIC** took over!

Note the rather simple tooling arrangement for machining cast iron sheaves on this Fastermatic. The set-up, similar to regular turret lathe work, is made just as easily. But here, the machine performs 15 different operations—completes the entire machining job in 13 minutes. Former time was 39 minutes.

Completely Automatic Cycle

It's the swift, automatic cycle of the Fastermatic that accounts for such substantial time-savings. With its hydraulic feed system and automatic speed control, the operator has only to load the chuck, start the machine and remove the finished work. And usually, the operator has time to tend a second machine.

Now, when you need still greater production, is a good time to look into the Fastermatics. Ask for complete information.

GISHOLT MACHINE COMPANY

1209 E. Washington Ave. • Madison 3, Wisconsin

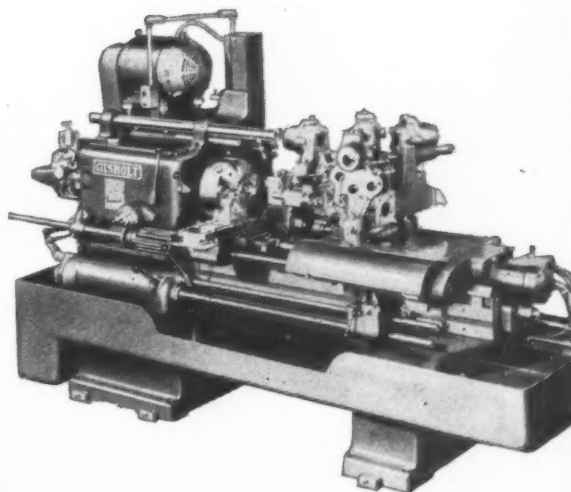
Look Ahead... Keep Ahead... with Gisholt



Rough Casting



Finished Sheave



The Fastermatics are universal automatic turret lathes. Designed for accurate, high production turning, they can also be economically used on comparatively small lot work. Write for literature.

ment
212.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

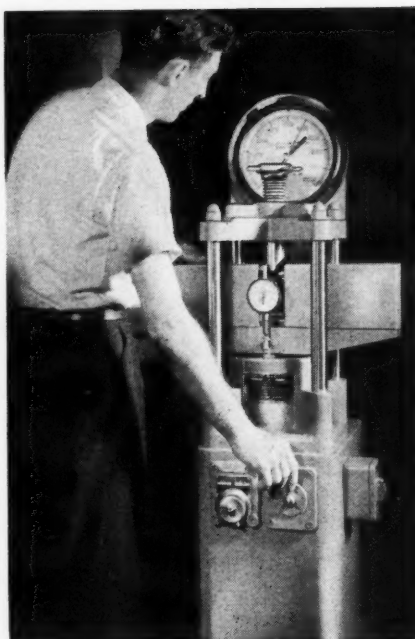
connectors; and assembling shoulder bushings, bearing housings, and light tubes to sheet metal or plastics.

A 1/8-H.P., 1200-R.P.M. ball-bearing motor with push-button control is used for rotating the spindle and peening tool. A pressure pad attachment is provided to eliminate vibration and to facilitate the production of accurate work. The pad advances ahead of the peening tool, holding the work rigidly against the rivet set or fixture. A positive stop assures uniform rivet heads, and is adaptable for assembling moving parts. The throat depth is 4 1/4 inches, frame travel 2 1/2 inches, and frame adjustment on the column to accommodate various size assemblies, 4 1/2 inches. The anvil height is 40 inches, and the over-all height 65 inches...82

Hydraulically Operated Transverse Testing Machine

A highly sensitive, hydraulically operated testing machine which can be used for making transverse tests with equal accuracy and efficiency on various specimens up to its full capacity of 10,000 pounds has been announced by the Steel City Testing Laboratories, 8843 Livernois, Detroit 4, Mich. The machine is supplied with electric motor drive at voltages to suit current requirements.

The load is applied automatically at the speed selected by the operator after loading the specimen on the supports and raising the load lever on the right side of the machine. Reversing the procedure serves to return the ram quickly to its original position. A specially constructed gage with maximum-pressure indicating hand is provided, which remains stationary when the test specimen breaks, permitting the operator to obtain accurate readings even though he is not observing the dial

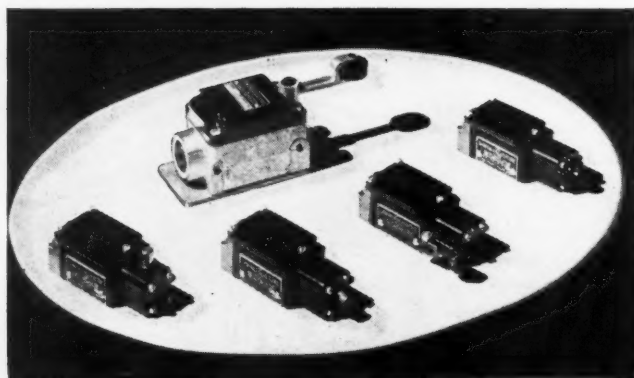


Transverse Testing Machine Announced by Steel City Testing Laboratories

when the ultimate breaking point is reached. The gages can be calibrated to read in kilogram loads if desired. The machine has a maximum span of 24 inches, an opening of 4 inches, and requires a floor space of 26 by 20 inches.83

G-E Oilproof Snap-Action Limit Switches

A small oilproof track type switch designed for machine tool or similar applications has been added to the line of limit switches made by the General Electric Co., Schenectady 5, N. Y. The switch can be applied in various ways through the use of interchangeable operating heads for roller-lever, roller-push-rod, push-rod, or plunger operation. It contains a single-pole, double-throw,



Oilproof Track Type Snap-action Switches Made by the General Electric Co.

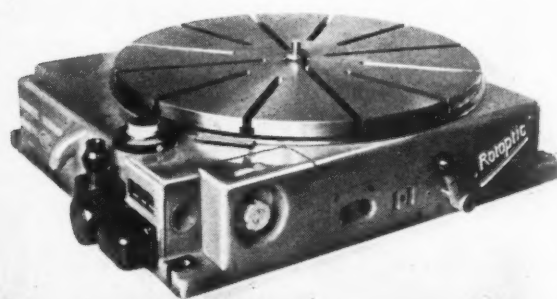
self-contained, snap-action control "Switchette." A sturdy molded phenolic enclosure protects the switch from lubricating or cutting oils and compounds.84

"Rotoptic" High-Precision Circular Dividing Table

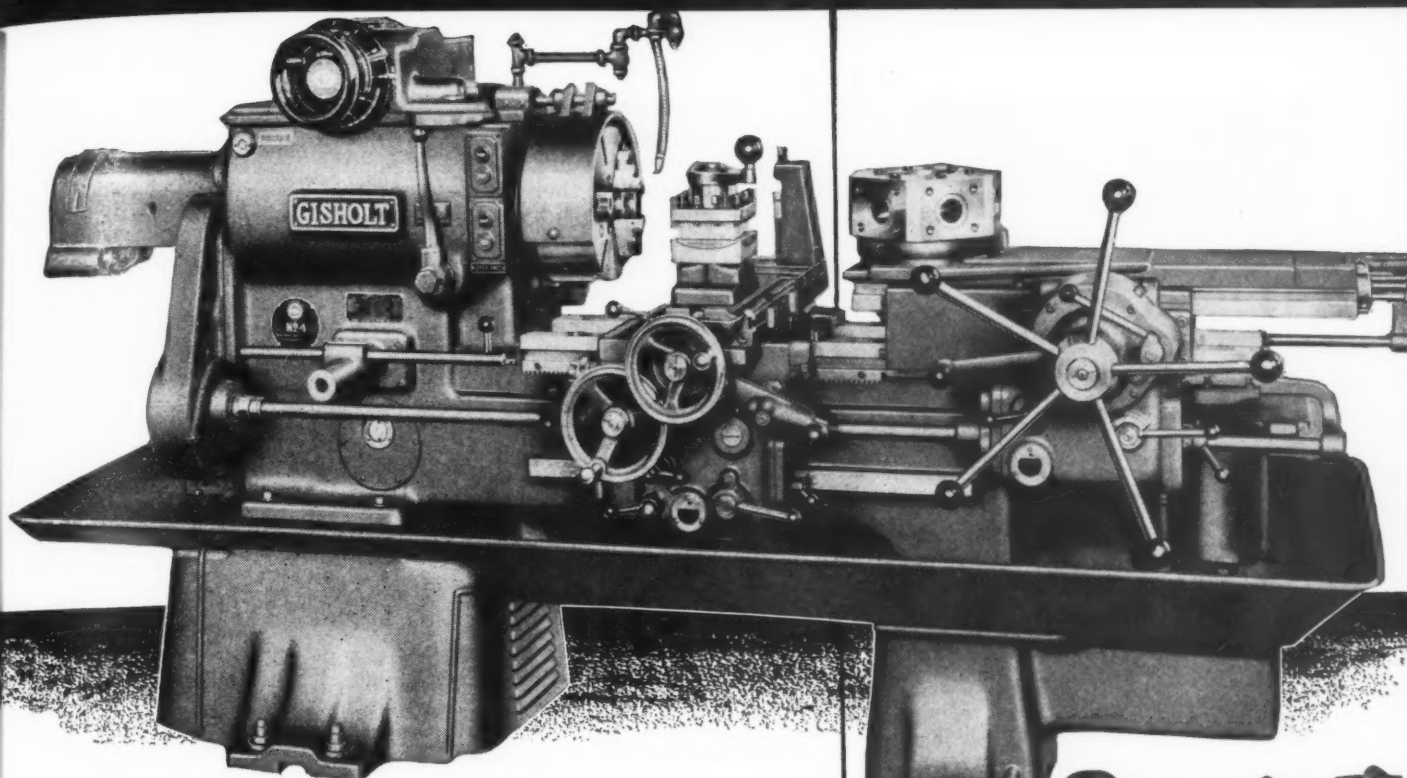
The Cosa Corporation, Chrysler Bldg., New York 17, N. Y., representative in the United States for the Societe Genevoise d'Instruments de Physique, Geneva, Switzerland, has announced a new "Rotoptic" high-precision circular dividing table having a working surface diameter of 31 1/2 inches. This table has been especially designed for use with the Hydroptic B jig boring and milling machine, and has been built to withstand the transverse stresses imposed by milling operations. The Rotoptic differs from the conventional dividing tables in that the worm is used only for rotating the platen, the angular measurement being made optically. The accuracy of this table for indexing or dividing purposes is, therefore, unaffected by wear of the rotating mechanism.

The outer edge of the platen is graduated in 1/6 of a degree for the initial positioning of the platen. Precision measurements are then made on a built-in graduated circle by means of a microscope. The latter instrument is provided with a double reticle line which is moved by the operation of a divided drum with a vernier reading to one second of arc.

The platen can be rotated at the rate of 4 R.P.M. by a motor in the base, which is controlled by push-buttons. The final settings are obtained by means of a knob keyed to the driving worm. Approximate and fine settings are thus available. The Rotoptic is equipped with a tiltable microscopic eye-piece.85



"Rotoptic" High-precision Circular Dividing Table for Hydroptic Jig Boring and Milling Machine



PRECISION *built* for PRECISION *work*

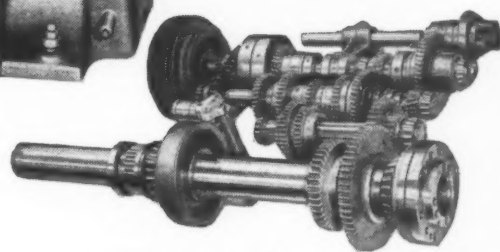
You can't expect (or get) accurate work from a machine tool unless accuracy is first built into the machine itself. For many years this basic truth has guided the building of Gisholt Turret Lathes. Snug, precisely fitted parts to eliminate vibration... ample bearing surfaces to prevent "play"... careful selection of steels to preserve tolerances... proper lubrication to prevent wear—these are the qualities that insure lasting accuracy.

Wherever an improvement in design or construction could contribute to greater accuracy and longer life, it has been made, without stint. That is why experienced users have confidence in Gisholt accuracy—why you'll so often hear them say, "Do the job right. Put it on a Gisholt!"

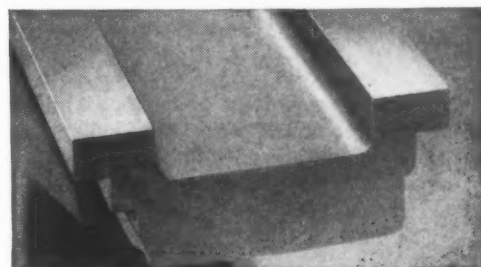
GISHOLT MACHINE COMPANY

1209 East Washington Avenue • Madison 3, Wisconsin

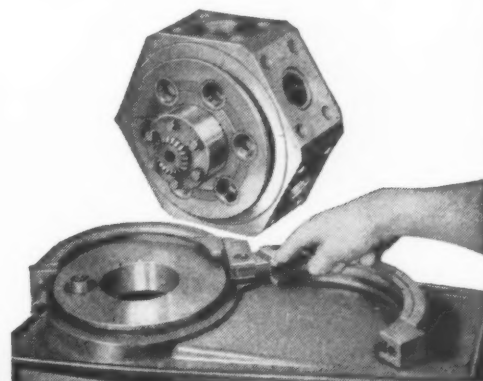
Look Ahead... Keep Ahead... with Gisholt



Gisholt's 12 speed gear train is a marvel of smooth power transmission. All gears are of heat treated and oil hardened alloy steel with ground tooth form.



Gisholt's bed ways are of the solid block type, ground in place to perfect alignment with the spindle, and hardened to 64-66 Rockwell "C".



Accurate indexing of the turret is insured with hardened and ground locating pin and bushings. This most powerful turret clamp known gives one-piece solidity to the locked turret.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINE



"Electrofluid" Drive Built by the Link-Belt Co.

Link-Belt "Electrofluid" Drive

The Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill., has brought out a new type of "packaged" power unit known as the "Electrofluid" drive, which will be available in capacities up to 20 H.P. This compact motorized hydraulic combination consists of a general-purpose alternating-current induction motor, flange-mounted on a sturdy housing containing a hydraulic coupling, also called a "fluid coupling." The output shaft may be direct-connected to the driven machine or to a speed reducer unit. It can also be connected to the driven machine through the medium of chain, gear, or belt drives.

Each fluid coupling has a primary and a secondary element. The primary element may be likened to a centrifugal pump impeller, and the secondary or output element to a water wheel or runner. The coupling is filled with a light mineral oil of

steam-turbine quality. When the motor drives the impeller, it causes oil to flow through the runner buckets back to the impeller, thereby rotating the runner through the medium of oil. The torque of the motor is transmitted from impeller to runner by the fluid in the coupling, there being no mechanical connection between the elements of the fluid coupling.

In effect, the fluid coupling inserted between the motor and its load serves as an automatic clutch, with the fluid acting as a "cushion" between the prime mover and the driven machine. The motor accelerates quickly, developing torque in the fluid coupling in the ratio of the square of the speed, until sufficient torque up to the maximum running torque of the motor is developed to start the driven load.

Should the driven machine become stalled, the "Electrofluid" drive will pull to the maximum torque capacity of the motor, thereby drawing sufficient current to cause the thermal overload protective device to function within a few seconds. The fluid traction coupling absorbs the energy of the motor rotor, protecting the driven machine from the shock of the rotor's inertia when the motor is suddenly stopped.86

Quick-Action Vise

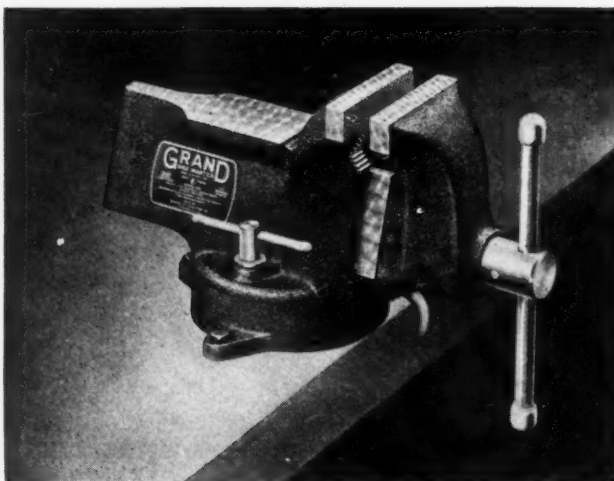
A quick-action, heavy-duty, general-utility vise known as the "Vise Master," has just been announced by the Grand Specialties Co., Grand Ave. at Troy St., Chicago 22, Ill. This vise can be closed instantly by simply pushing the free jaw inward. Opening the vise to the full width of 4 3/8 inches is accomplished auto-

matically by spring action after tension is eased by a slight turn of the clamping handle through the application of pressure to the trigger of a releasing arrangement. These features have previously been available only on the smaller "Quickset" vise made by the company. The vise is also equipped with "double bite" steel pipe jaws which require no adjustment for holding pipe or tubing. The vise can be revolved on its base through a complete circle of 360 degrees. A friction type lock-up, which applies clamping pressure on both sides of the base, holds the vise in the desired angular position.

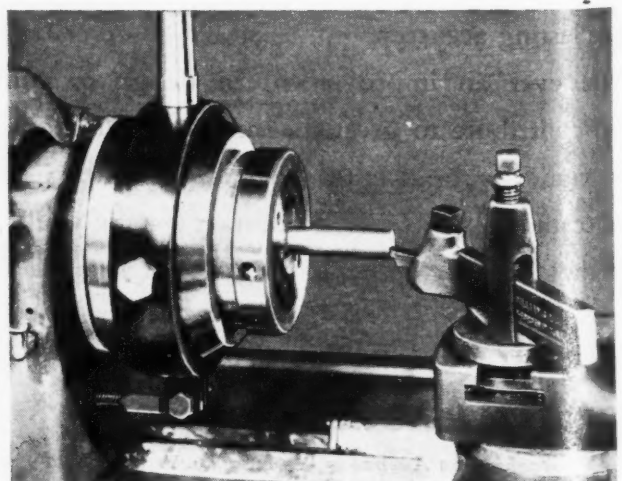
The vise has a large anvil top, polished serrated hardened jaws, is rustproofed, and has a red stippled lacquer finish. It weighs 23 3/4 pounds; is 17 1/2 inches long with the jaws open and 13 inches long with the jaws closed; has a width of 7 1/2 inches, and a height of 7 1/4 inches.87

Porst Lever-Operated Collet Chuck

A new principle of construction is said to be embodied in the "Lever-matic" collet chuck recently brought out by Porst Bros., 259 N. California Ave., Chicago 12, Ill. This collet chuck has a maximum capacity of 1 inch, and is designed to insure a positive, straight, and parallel grip on the work at all times and a steadier hold throughout the full length of the collet bearing to compensate for irregularities in the work. A knurled hand-operated selective collet adjustment ring with rapid self-locking positions maintains a predetermined pressure and

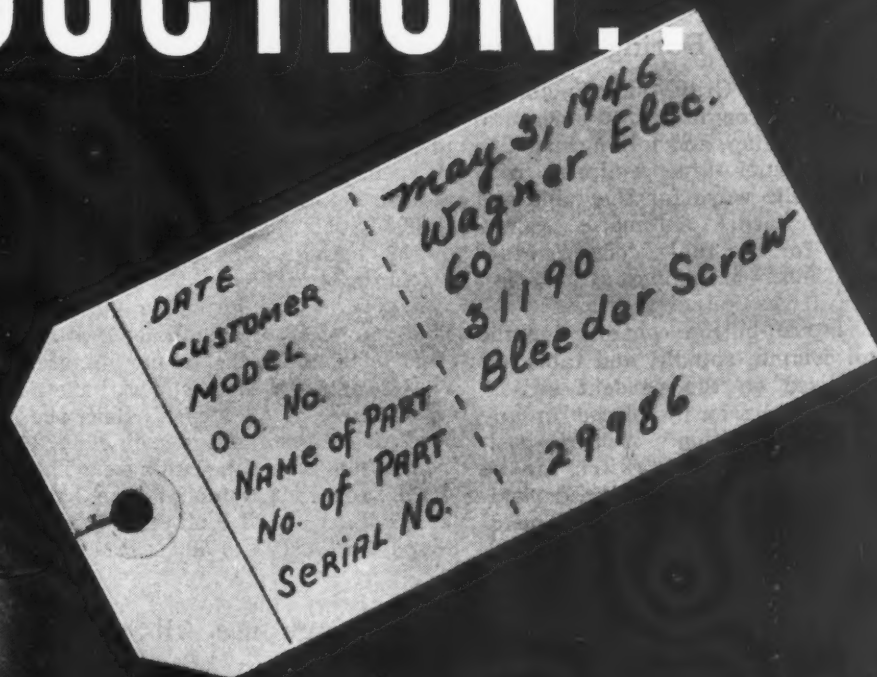


Quick-action Vise Brought out by the Grand Specialties Co.



Lever-operated Collet Chuck Brought out by Porst Bros.

PRODUCTION.

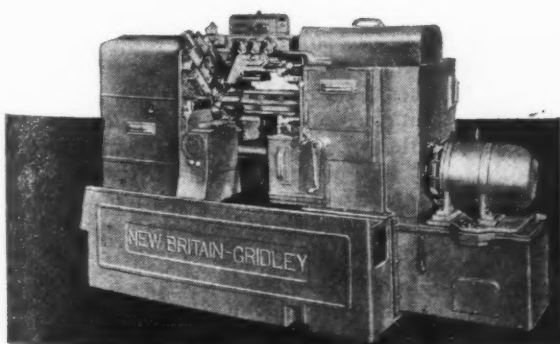


6 OPERATIONS

4.15 SECONDS PER PIECE

869 PIECES PER HOUR AVERAGE

New Britain Model 60 Multiple Spindle Automatic Screw Machine on which the part shown above is machined.



M-01051

**For more, better parts per hour
this year and years from now,
it pays to pick**

NEW BRITAIN

**THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT**

assures a solid grip on tough steel bars subjected to heavy cuts, as well as a firm gentle grip on thin tubing and plastic materials.

The chuck is threaded to fit on the

lathe spindle nose with both minimum overhang and runout. The rotating chuck can be operated without stopping the spindle by a hand-actuated lever.88

Gray Boring, Drilling, and Milling Machine

The G. A. Gray Co., Cincinnati, Ohio, has brought out a horizontal boring, drilling, and milling machine of the planer type equipped with non-metallic ways for the table and column base; automatic power clamps for the table, column, headstock, and end support; and electronic drives for all feeds.

The push-button controls for the head, column, spindle, and table are centralized on the pendent switch, which can be easily placed in any convenient position. A three-position selector on this switch can be set to one of three positions, depending on whether the column, headstock, or spindle is to be operated. Four push-buttons and a potentiometer are used to obtain feed, rapid traverse, and micro-positioning of the unit for which the selector is set. When the selector is set for the "head" position, the column is automatically clamped to the runway, and when set for "column" position, the headstock is clamped to the main column and the end-support boring block is automatically clamped to the end-support column.

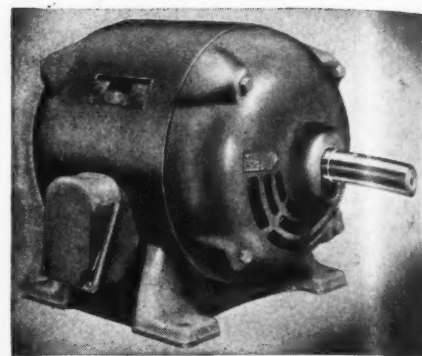
The use of separate motors for the table and headstock permits independent feeds and makes it possible

to follow an irregular line with the cutter by push-button control. Simply pressing a micro-jog button on the pendent switch enables the operator to set the various units within 0.00025 inch.

The spindle has a longitudinal travel of 84 inches, and is driven by a motor developing up to 50 H.P. The range of the spindle feed is from 0.020 to 12 inches per minute. The column and end support have a cross travel of 36 inches. Both the head and table have feeds of 1/2 inch to 60 inches per minute. The speed range for 5- and 6-inch bars is 4 1/2 to 900 R.P.M., for 7- and 8-inch bars, 2 1/2 to 500 R.P.M.....89

Westinghouse All-Steel Induction Motors

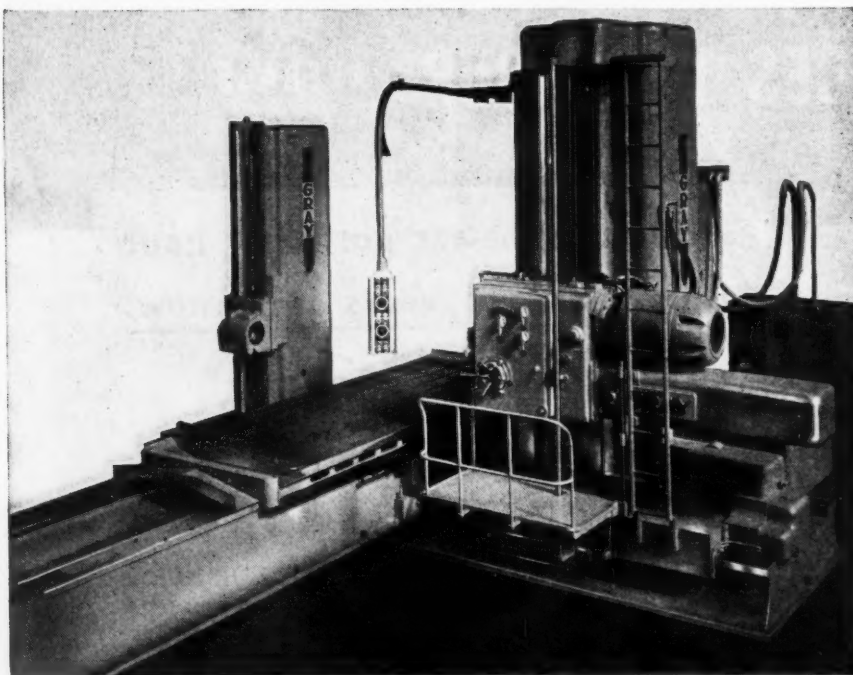
All-steel construction, including the frame feet and end brackets, has made possible a reduction of 35 per cent in the size of the new "Life Line" squirrel cage induction motor brought out by the Westinghouse Electric Corporation, Pittsburgh 30, Pa. This new motor is also lighter in weight, more rigid, and can stand greater impact than its predecessors.



Westinghouse All-steel "Life Line" Induction Motor

It is available in drip-proof, splash-proof, and fan-cooled construction. Special features include a frame rolled from steel plate as thick as would be used if cast iron were employed; feet and end brackets of heavy pressed steel; all welded construction; self-sealed, pre-lubricated ball bearings having sufficient lubricant for five years or longer without repacking; rounded corners at top and bottom of slot cells that eliminate creasing cell insulation; special synthetic resin-covered wire for coils; dynetrically balanced rotor; and interchangeability of parts.

This motor is available in sizes from 1/2 to 20 H.P.; in voltages of 208, 220, 440, and 550; in two- and three-phase; in frequencies and speeds of 60 cycle, 3500, 1750, 1150, and 865 R.P.M., 50 cycle, 2920, 1450 965, and 720 R.P.M., 25 cycle, 1450 and 725 R.P.M.; and in NEMA standard frames 203 to 326. 90



Planer Type Boring, Drilling, and Milling Machine Built by G. A. Gray Co.

Chrome-Cobalt High-Speed Steel

A chrome-cobalt high-speed steel especially developed for taps and threading tools is now being used exclusively by the Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich., for its complete line of standard and special taps, as well as for taps designed and produced to special order. Among the advantages claimed for this new steel are higher resistance to abrasion, reflected in longer life and reduced wear; greater toughness, with high hardness, resulting in less chance of tooth breakage; higher red-hardness temperature, which permits efficient use of taps at drill speeds or even higher speeds; and higher torsional strength, which imparts to the tap greater resistance to twisting and breakage, particularly under momentary overload conditions. 91

No stops - No steps

REEVES-EQUIPPED MACHINES MAKE EVERY MINUTE COUNT!

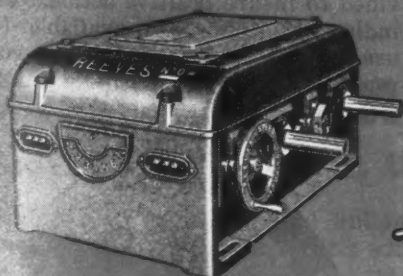
REEVES Variable Speed Drives increase the efficiency of your machines in two important ways. First, REEVES Speed Control provides accurate, *instant* speed changes... without "shut-downs" that steal productive time. *No stops!* And secondly, REEVES provides *infinite*, stepless speed adjustability... precisely the right speed for every operator and every operation under every changing condition. *No steps!* The net effect of these twin advantages—no stops, no steps—is to make every working minute count... to make REEVES-equipped machines more versatile and more

productive more of the time.

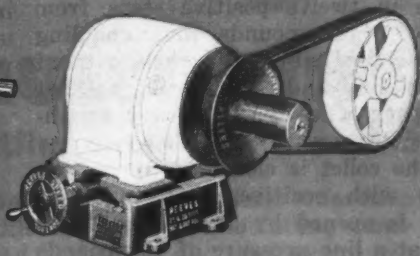
All REEVES units are simply designed, ruggedly built and easy to maintain. They are standard equipment on more than 2,100 different makes of machines... easily installed on machines already in service. So get complete information on REEVES Variable Speed Drives today by writing for comprehensive 96-page catalog M-450.

On the 50-ton press brake illustrated above, manufactured by Dreis & Krump Manufacturing Company of Chicago, a REEVES Vari-Speed Motor Pulley enables the operator to obtain the most efficient ram speed for bending, breaking, shearing, punching and numerous other operations involving a wide variety of sizes and shapes and different gauges of metal.

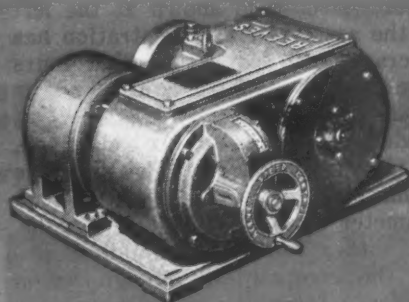
REEVES PULLEY COMPANY • COLUMBUS, INDIANA



VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

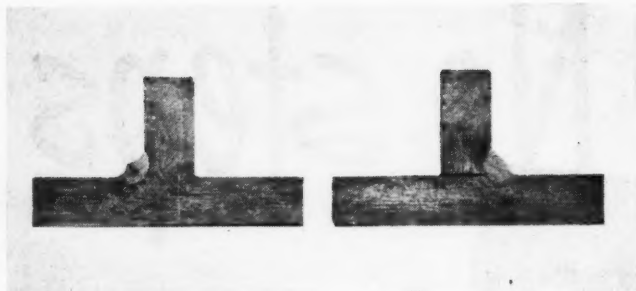


VARI-SPEED MOTOR PULLEY converts any standard constant speed motor to a variable speed drive within 4:1 ratio. Sizes to 15 hp.

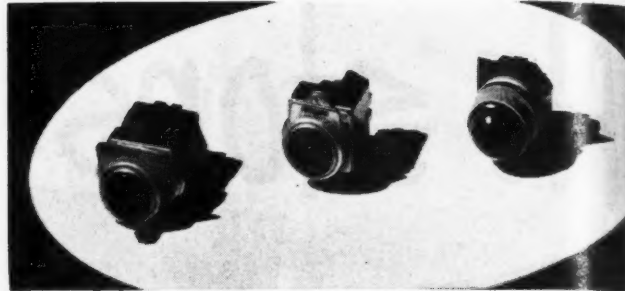


MOTODRIVE combines motor, speed varying mechanism and reduction gears in single compact unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 15 hp.

Accurate Variable
REEVES Speed Control
Give the Right Speed for Every Job!



Cross-sections of High-carbon Steel Welds Made with Mild Steel Electrode (Left) and "Shield-Arc" Electrode (Right)



Oil-tight Push-button Unit, Selector Switch, and Indicating Light Brought Out by the General Electric Co.

Lincoln Electrodes

An electrode developed to simplify the welding of high-sulphur, free-machining steel, and certain high-tensile low-alloy steels has just been announced by the Lincoln Electric Co., Cleveland 1, Ohio. The new electrode, known as "Shield-Arc LH-70," has a low-hydrogen, low-moisture coating and is designed for use with direct current. The welded metal has a tensile strength of 70,000 to 80,000 pounds per square inch and an elongation of 25 to 30 per cent.

Materials that are to receive a coating of enamel can be welded with LH-70 electrodes without requiring heat-treatment to drive out hydrogen which would otherwise form bubbles and cause the enamel to peel. This electrode is also adapted for welding and rebuilding rubber molds, which are usually made of high-sulphur steel, and for welding alloy-steel gears which show a tendency to crack when welded with most electrodes. The cross-section of the high-carbon steel weld shown at the left in the accompanying illustration has a crack such as frequently occurs when a mild-steel coated electrode is used. The weld shown at the right, made with a "Shield-Arc" electrode, is free from cracks. The electrode is made in 1/8-, 5/32- and 3/16-inch diameter sizes and 14-inch lengths.

Another new electrode developed by the company is a high-carbon electrode for building up worn steel parts by welding with low-voltage alternating-current transformers, as well as with direct-current. These electrodes are designated as "Hardweld 50 A.C." and "Hardweld 100 A.C." to differentiate between "Hardweld 100" and "Hardweld 50" electrodes which operate only on direct current. The alternating-current electrodes are designed to produce a dense, tough surface of moderate hardness to resist shock and abrasion. They have a heavily extruded shielded-arc type coating, produce

flat, smooth beads, and deposits that can be hot-forged. The Hardweld 100 A.C. electrode deposited on straight carbon steel and allowed to cool naturally has a hardness of 20 to 45 Rockwell C, and the Hardweld 50 A.C. electrode has a hardness of 20 to 35 Rockwell C. The hardness of the deposits can be increased by water quenching from about 1500 degrees F., or by flame hardening.

Hardweld 100 A.C. electrodes are made in 1/8-, 5/32-, 3/16-, and 1/4-inch sizes, and the Hardweld 50 A.C. in 3/16- and 1/4-inch sizes.92

"Almco" Collet Chuck for Screw Machines

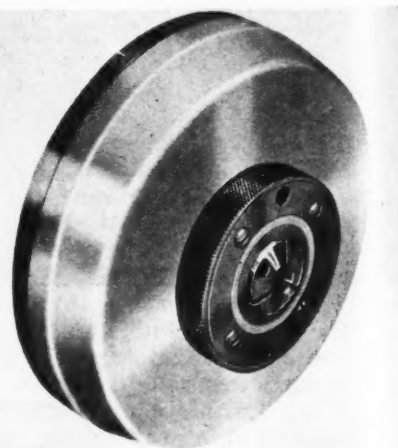
A new type of collet chuck for use on all hand screw machines and engine lathes with capacities up to 1 inch has been announced by the Modern Collet & Machine Co., 401 Salliotte St., Ecorse 18, Mich. This unit, known as the "Almco" jet type collet chuck, embodies an entirely new operating principle. The gripping pressure of the collet is adjustable in twelve positive steps from 0 to 15,000 pounds thus enabling thin-walled tubing to be held without distortion and bar stock without slippage when taking heavy roughing cuts.

The collet is closed by spring action with positive, uniform force, and is opened by a compressed air jet at a line pressure of 100 pounds per square inch. This design eliminates danger of the chuck opening in case of air pressure failure. There is no contact between the air nozzle and the chuck to cause wear, and the chuck can be operated in any position.

The collet is positively positioned in the chuck and cannot become loose. Collets are available in sizes up to 1 inch capacity, and in round, hexagonal, and square shapes. The overall length of the chuck, including the collet, is 2 3/4 inches, and the weight is 11 1/2 pounds.93

G-E Oil-Tight Push-Button Units, Selector Switches, and Indicator Lights

A new line of oil-tight push-button units, selector switches, and indicating lights especially designed for the machine tool and automotive industries has been announced by the Control Division of the General Electric Co., Schenectady 5, N. Y. Protection against entrance of oil is provided by a diaphragm seal and a rubber gasket. Momentary-contact push-button units are available in several forms. The single-pole unit provides a normally open and a normally closed circuit. The three-point unit provides two normally open circuits with a common connection. Double-pole units are also available with either normally open or normally closed circuits. All contacts are double-break and made of silver. The selector switch unit is obtainable in single-pole double-throw or double-pole single-throw forms. The contacts are cam-operated, and heavy springs and sliding contacts are provided to insure positive action. The indicating lights are available for use on alternating or direct current. 94



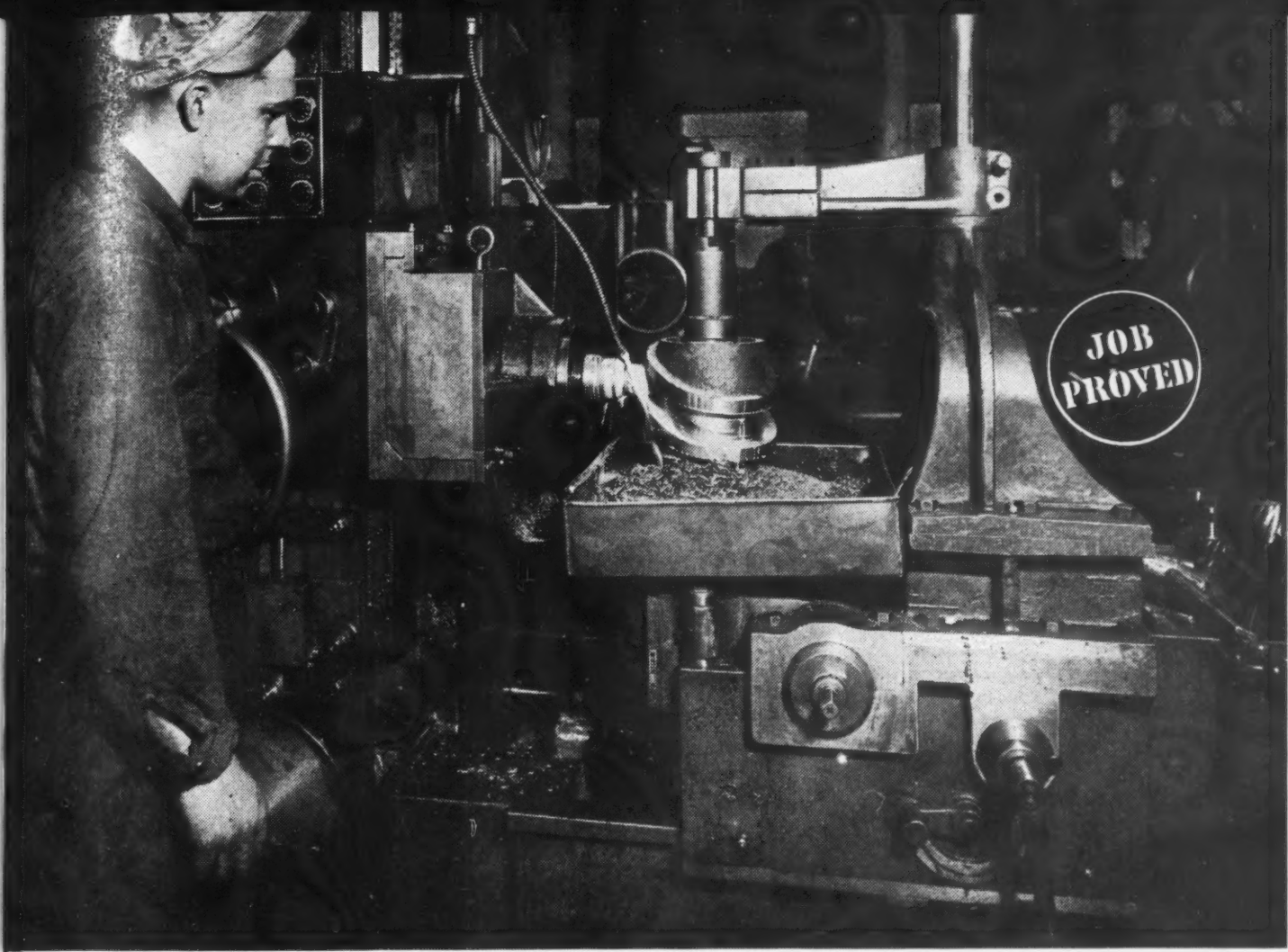
Jet Type Collet Chuck Made by Modern Collet & Machine Co.

nting

on
s,

utton
icacat-
the
adus-
Con-
etric
tion
ided
ober
ush-
eral
ides
ally
unit
uits
ble-
with
ally
are
The
in
ole-
on-
avy
ro-
The
for
ur-
94

nt
2.



CUTTER LIFE DOUBLED ... *Costs cut 25%*

SUNOCO EMULSIFYING CUTTING OIL

Used for Milling Cams, Eliminates Stains and Odor, Produces Better Finish

A well-known machine-tool builder, in the cam-milling operation shown above, was not obtaining satisfactory finish. The cutting emulsion had an objectionable odor and had to be changed every two weeks.

Lubrication costs were cut 25% when they changed to Sunoco Emulsifying Cutting Oil for both milling and grinding. The new oil lasts more than four times as long. Cutter life has doubled. Finish has improved. Objectionable odor eliminated.

The facts:	Machine: Rowbottom cam miller	Tool: High-speed Weldon end mill
	Operation: Milling cams	
	Material: Air-cooled alloy steel casting	Cutting Lubricant: 1 part Sunoco to 15 parts water
	Depth of cut: $\frac{3}{8}$ "	

In hundreds of shops Sunoco Emulsifying Cutting Oil has been "Job-Proved." It mixes easily with water. Its high cooling and lubricating qualities are important wherever ferrous or non-ferrous materials must be cut with precision and at high speed.

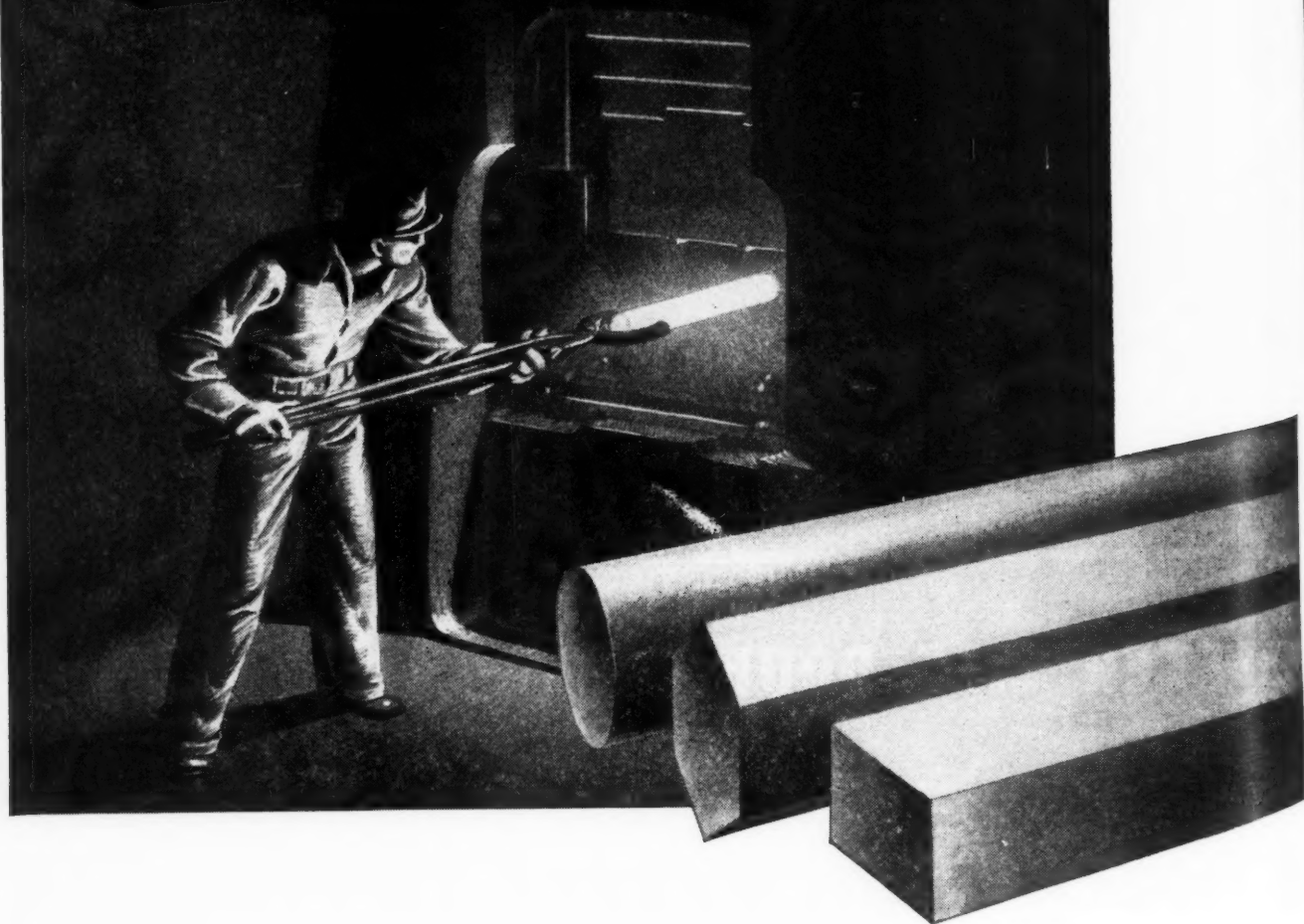
SUN OIL COMPANY • Philadelphia 3, Pa.
Sponsors of the Sunoco News-Voice of the Air — Lowell Thomas

SUN

INDUSTRIAL PRODUCTS

JALLOY

THE HARD, TOUGH STEEL FOR
FORGED AND HEAT TREATED PARTS



JALLOY is a special steel particularly applicable for machine parts that are subjected to dynamic stresses, sudden shocks or abrasive action. It can be forged and heat treated to obtain the desired physical properties. Write for further information.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PENNSYLVANIA





Fig. 1. Kennametal Knee Type Tool Bit

Kennametal Turning Tools

Kennametal Inc., Latrobe, Pa., has developed a new line of Kennametal-tipped tool bits of the design shown in Fig. 1 for use in knee attachments of turret lathes. These bits are available in sizes of 1/2 inch square by 3 1/2 inches long; 5/8 inch square by 4 inches long; and 3/4 inch square by 4 1/2 inches long for machining steel, cast iron, and non-ferrous metals.

The company has also developed a line of broad-nose tools of the design shown in Fig. 2 for turning cast-iron rolls up to a hardness of 90 scleroscope. These roll-turning tools comprise Kennametal Grade K6 blades held securely in position on an accurate surface of the supporting shank by a clamp and serrated, advanceable back-up plate.

The Kennametal blade has four cutting edges which can be used in succession before any sharpening is required. When all four edges have become dull, they can be reground on the long sides and advanced to the required cutting position. Resharp-ening and setting can thus be repeated until two-thirds of the blade has been utilized. These tools are available in four standard cutting widths of 4, 6, 8, and 10 inches.....95

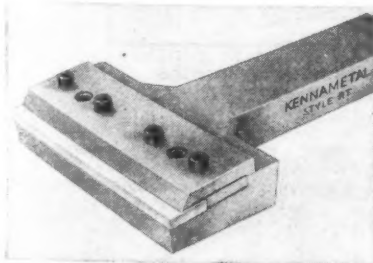
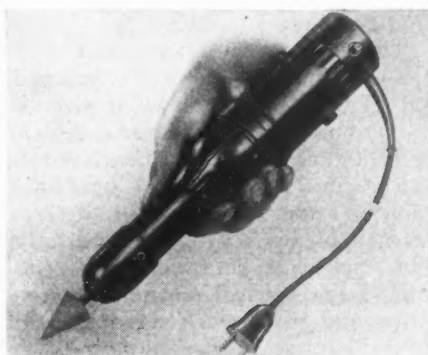


Fig. 2. Kennametal Roll-turning Tool

High-Speed Electric Hand Tool

A new electric hand tool and portable grinder with a 1/5-H.P. motor capable of operating at speeds up to 40,000 R.P.M., for use in grinding, milling, drilling, finishing, and polishing metals, plastics, and glass, and for special operations such as milling hardened steel and stainless-steel welds with carbide cutters, has been developed by Precise Products Co., 1328-30 Clark St., Racine 4, Wis. This tool has a high-impact plastic case and weighs 40 ounces.

Special features include a larger more rigid precision quill with a No. 0 Morse taper for interchangeable mounting of precision collet chucks



High-speed Electric Hand Tool
Made by Precise Products Co.

for rotary cutters and millers; and a Jacobs chuck for small or special arbors for unmounted grinding wheels, small-diameter drills, and abrasives of various kinds. Special spindles can also be used to extend the quill length for internal grinding and engraving. The ball bearings which support the quill and motor shaft are lubricated by means of a small pressure gun. Cooling is accomplished by a fan mounted on the motor shaft. The tool can be used alone as a hand tool or it can be mounted on a stand, vise, lathe, or milling machine. Accessories for special use include a flexible-shaft attachment for close work, speed controls, drill stand, lathe attachment, and "Vari-Speed" lathe.....96

"Neutralene" Gas Producer for Heat-Treating Operations

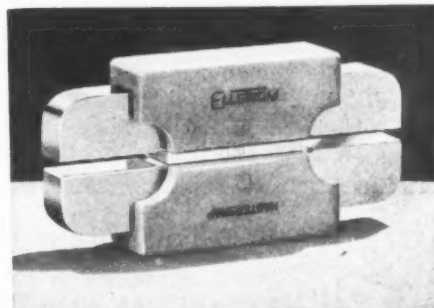
"Neutralene" gas producing equipment designed to provide a neutral carbon-dioxide-free, dry, combusted gas for heat-treating medium- and high-carbon steels without decarbur-

ization has been brought out by the Industrial Heating Division of the General Electric Co., Schenectady 5, N. Y. The "Neutralene" gas atmosphere is especially suitable for bright annealing, clean hardening and furnace brazing of medium- and high-carbon steels, hardening of high-speed steel, and sintering of high-carbon ferrous metals. The basic unit of this new equipment is a complete portable assembly, mounted on a single base.

This equipment is adapted for use as a "central" atmosphere gas producing plant to supply gas to multiple furnaces. An installation of this type is said to offer the advantages of a uniform atmosphere in the furnaces, lower equipment cost, and lower operating cost.97

Ellstrom "Mastersnap" Gages

A new type of snap gage using special gage-blocks as accurate non-wearing spacers in interchangeable assemblies has been announced by the Dearborn Gage Co., 22038 Beech St., Dearborn, Mich. The new gage known as the Ellstrom "Mastersnap," consists of a special gage-block wrung between a pair of chromium-plated special alloy-steel jaws and locked in position by brass thumb-screw fasteners. Colored thermoplastic insulator grips—green for "Go" combinations and red for "No Go" combinations—are fitted over the jaws and held in place by means of plastic pins to complete the gage



Ellstrom "Mastersnap" Gage

assembly. By this arrangement, the special gage-blocks are not subjected to wear and can be used indefinitely without impairing their original accuracy. The chromium-plated jaws can be refinished separately to insure flat gaging surfaces. Assembling the "Mastersnap" to give the desired snap-gage size is said to require no special skill.

Special gage-blocks for the "Mastersnap" are available in sizes from

0.050 inch to 2 inches, inclusive. They can be used separately or in combinations to form a wide range of double-end snap-gage sizes. Separate "Mastersnap" assemblies are required for the "Go" and "No Go" combinations. Of the two sets of jaws now available the 3-inch pair is recommended for sizes under 0.500 inch, while the 4-inch jaws are used for sizes over 0.500 inch.98

**"Standard Hi-Speed"
Power Hacksaw**

The "Standard Hi-Speed" power hacksaw formerly known as the Rodgers power hacksaw is now being manufactured by the T & S Engineering Co., 15 N. Euclid Ave., Pasadena 1, Calif., in two models to meet the requirements of both small and large shops. Outstanding features include provision for raising

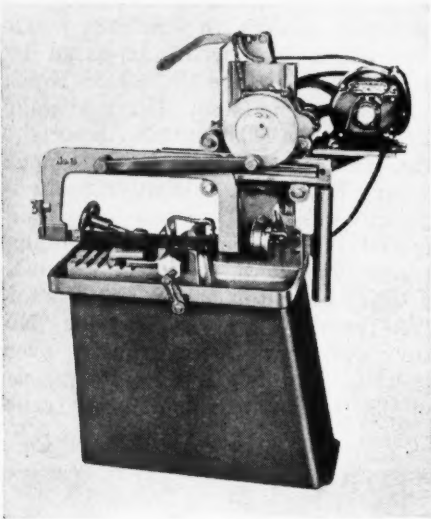


Fig. 1. Floor Model "Standard Hi-Speed" Power Hacksaw

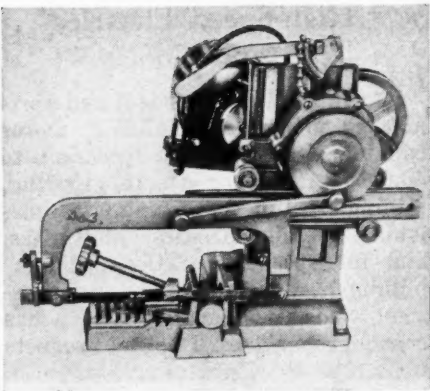


Fig. 2. Bench Model "Standard Hi-Speed" Power Hacksaw

the blade on the return stroke; ball-bearing guides for the saw frame; automatic cut-off switch; and provision for angular cutting.

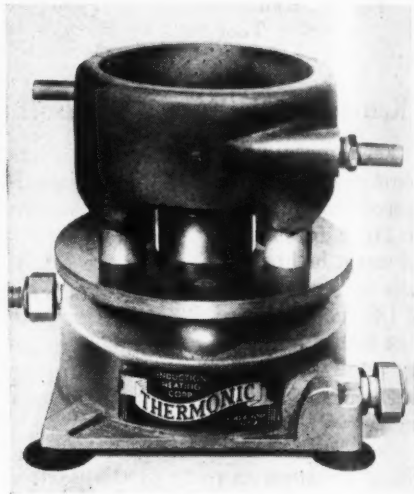
The floor model, shown in Fig. 1, has a 14-inch power blade which will cut off work 6 by 6 inches in size. It is equipped with an integral coolant pump and reservoir. The bench model, shown in Fig. 2, has a 4- by 4-inch capacity, and is equipped with a 12-inch blade for dry cutting only. This model is portable, and is designed for service in small machine shops and home work shops, as well as for electricians' use.99

**Rotary-Spindle Quenching
Accessory for Induction
Heating Equipment**

A compact hydraulic rotary spindle and quenching ring, combined in a single unit, is a recent addition to the line of "Ther-monic" accessories made by the Induction Heating Corporation, 389 Lafayette St., New York 3, N. Y. This unit is designed

for use with any type of induction heating equipment. It has been developed to simplify the handling and heat-treatment of parts requiring rotation during the heating cycle and subsequent quenching in the heating position. By rotating the work, the unit serves to eliminate the necessity for precise location of the work in the coil and insures uniformity of heat-treatment of such parts as gears, splines, pulleys, and similar circular pieces.

The piece to be treated is located on a spindle which is actuated by a water-driven turbine. The speed of



Rotary-spindle Quenching Unit for Induction Heating

rotation is readily controlled by varying the flow of water. The combination unit is portable and can be easily moved from one coil to another. Interchangeable quench rings and adapters are available in four sizes of 4 3/4, 7, 9, and 12 inches inside diameter.100

To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described in this section is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning machine as described in December, 1946, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Fill in your name and address on blank below. Detach and mail within three months of the date of this issue to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

NAME.....POSITION OR TITLE.....
[This service is for those in charge of shop and engineering work in manufacturing plants.]
FIRM.....
BUSINESS ADDRESS.....
CITY.....STATE.....

MAKE EVERY TOOL PRODUCE MORE



HOBBS, counterbores, drills, chasers, taps, reamers...tools of all kinds...whatever the type of machining or the metal being worked, you'll get more cuts per tool grind when you lubricate with *Texaco Cutting and Soluble Oils*. The experience of plants everywhere proves this.

Texaco Cutting, Soluble and Grinding Oils both lubricate and cool. They prevent chip welding and permit higher cutting speeds. The results are longer

tool life and increased production... better finish and fewer rejects... on every job.

Enjoy Texaco benefits in *your* plant. The services of Texaco Lubrication Engineers specializing in cutting coolants are available, without obligation, through the more than 2300 Texaco distributing plants in the 48 States. Call the nearest one, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO CUTTING, SOLUBLE AND GRINDING OILS

FOR FASTER
MACHINING

Tune in . . . TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. Metropolitan Opera broadcasts every Saturday afternoon.

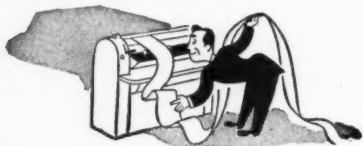
MACHINERY, December, 1946—213

NEW! THE OZALID STREAMLINER



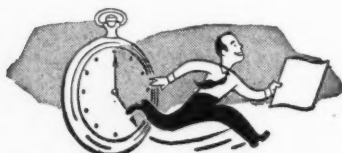
- Reproduces your engineering and architectural drawings in seconds—also your typed, printed, photographic material.
- Moderately priced . . . designed for the thousands of drafting rooms that want these 5 EXTRA VALUES in Printmaking at no extra cost—

1. EFFICIENCY! You always get positive (not negative) prints direct from your tracings . . . prints that are sharper, brighter, much easier for you to read, check, and make notations on.



You produce these without waste of material or waste of motion. Your tracings can be up to 42 inches wide, any length . . . and can be printed either on rolls of Ozalid sensitized paper or on cut sheets of matching size.

Your prints are always delivered dry, ready for immediate use . . . after just two simple operations—Exposure and Dry Development.



2. SPEED! ONLY 25 seconds to reproduce your standard-size tracings, specification and data sheets, etc.

3. ECONOMY! An 8½ x 11-inch reproduction costs you *one cent*; 11 x 17 inches, two cents . . . and so on. The Ozalid Streamliner soon pays for itself . . . in time, labor, and dollars saved.

With it, you can also effect amazing short cuts in design. For example—eliminate redrafting when changing ob-

solete drawings . . . combine the details of separate tracings on *one* print . . . re-



claim old or worn tracings . . . make transparent overlays in different colors.

4. VERSATILITY! You can reproduce the lines and images of any original in black, blue, red, sepia, or yellow . . . on paper, cloth, foil, film, or plastic.

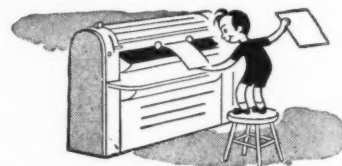
Simply use the Ozalid sensitized material you think best for job at hand; e.g., use identifying colors for prints of separate departments or operations . . . **DRYPHOTO** to produce beautiful con-



tinuous-tone prints from film positives (which can be made from any negative)

. . . **OZAPLASTIC** to produce oilproof, waterproof prints for shop or field use. *All* prints are made in same fast, economical manner.

5. SIMPLICITY! NOW—printmaking is an easy desk job, automatic in practically every detail.



Anyone can feed originals and sensitized material into the Ozalid Streamliner. Prints are delivered on top, stacked in order—within easy reach of the operator, who does not have to leave her chair.

You can install your Streamliner anywhere; it requires only 11 square feet of floor space.

Write today for free, illustrated booklet . . . showing all the ways you can use the new **OZALID STREAMLINER** . . . and containing actual reproductions—like those you can make.

Gentlemen:

DEPT. 183

Please send New Ozalid Streamliner booklet . . . containing reproductions of drawn, typed, printed, and photographic material. No obligation.

Name _____

Position _____

Company _____

Address _____

OZALID

DIVISION OF
GENERAL ANILINE AND FILM CORPORATION
Johnson City, New York

Ozalid in Canada
Hughes Owens Co., Ltd., Montreal

New Trade Literature

RECENT PUBLICATIONS ON MACHINE SHOP EQUIPMENT, UNIT PARTS, AND MATERIALS

To Obtain Copies, Fill in on Form at Bottom of Page 216 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the December, 1946, Number of MACHINERY

Shot-Peening Data

AMERICAN FOUNDRY EQUIPMENT Co., Mishawaka, Ind. Book containing a complete discussion of the applications and advantages of shot-peening and the equipment and procedures used. The theory of prestressed surfaces in relation to shot peening is also covered. Copies of this book can be obtained by executives without charge if requested on a firm letter-head addressed directly to the company.

Resistance-Welding Alloys Chart

AMPICO METAL, INC., 1745 S. 38th St., Milwaukee 4, Wis. Chart entitled "Comparative Resistance-Welding Alloys," listing by groups, classes, and trade names alloys produced by Ampco Metal, Inc., and seven other companies in the resistance-welding field. A table of minimum physical properties for R.W.M.A. alloys is also available.1

Drill and Reamer Data

WHITMAN & BARNES DIVISION OF UNITED DRILL & TOOL CORPORATION, Detroit 16, Mich. Catalogue 100, containing 202 pages covering the complete line of drills and reamers made by the company, and including data on the design, construction, use, and care of drills and reamers.....2

Diamond Pins for Accurately Locating Work

U. S. ENGINEERING CO., 140 Nassau St., New York 7, N. Y. Bulletin containing a technical article on the use of the diamond pin in accurately locating work, including diamond pin formula.3

Screw Machine Accessories

MODERN COLLET & MACHINE CO., 401 Salliotte St., Ecorse 18, Mich.

Catalogue descriptive of this company's line of collets for screw machines, lathes, and milling machines; pushers; alloy-steel screw machine cams; gears; and screw machine replacement parts.4

Hydraulic Presses, Grinding Machines, Steel Mill Equipment

BIRDSBORO STEEL FOUNDRY & MACHINE Co., Birdsboro, Pa. Catalogue covering the Birdsboro line of products, which include hydraulic presses, steel mill equipment, iron and steel rolls, grinding machines, steel castings, and jaw crushers.5

Induction Heating

TOCCO DIVISION OF THE OHIO CRANKSHAFT Co., 3800 Harvard Ave., Cleveland 1, Ohio. Bulletin entitled "Induction Heating," containing 59 pages covering the general history, principles, and applications of the induction heating process.6

Lapping Equipment

FLEXOLAP MFG. Co., 2156 W. Fulton St., Chicago 12, Ill. Circular descriptive of the Flexolap toolmaker's bench set of commonly used sizes of laps. Leaflet containing list prices for Midget laps.7

Fixtures and Tooling

BARNES DRILL Co., 814 Chestnut St., Rockford, Ill. Bulletin 3, describing hydraulic, electrical, pneumatic, and manually operated fixtures for the low-cost, rapid handling of a wide variety of work.8

Fractional-Horsepower Gears

GEAR SPECIALTIES, 2635 W. Medill Ave., Chicago 47, Ill. Catalogue illustrating and describing many applications of small gears, ranging from 12 to 96 diametral pitch.....9

Alloy-Steel Sling Chains

JOSEPH T. RYERSON & SON, INC., 16th and Rockwell Sts., Chicago, Ill. Circular descriptive of "Taylor Made" alloy-steel sling chain for use where high tensile strength is required.10

Prepared-Atmosphere Roller-Hearth Furnaces

SURFACE COMBUSTION CORPORATION, Toledo 1, Ohio. Bulletin SC-132, descriptive of "Surface" prepared-atmosphere roller-hearth furnaces for ferrous and non-ferrous bars, tube, and strip.11

Seam Welders

PROGRESSIVE WELDER Co., 3050 E. Outer Drive, Detroit 12, Mich. Bulletin 803, on the design, operation, and applications of the company's improved standard and special seam welders.12

Molding of Plastics

DUREZ PLASTICS & CHEMICALS, INC., North Tonawanda, N. Y. Booklet entitled "Transfer Molding Pressures," containing technical information on the transfer method of molding plastics.13

Hacksaw and Band-Saw Data

CAPEWELL MFG. Co., 60 Governor St., Hartford 2, Conn. Handbook containing data of value to the operator of hacksaw machines and the user of hand hacksaw blades and metal-cutting band-saw blades.14

Packaging Materials

PROTECTIVE COATINGS CORPORATION, 689 Main St., Belleville 9, N. J. Technical Data Book covering various materials developed by the company for protecting packaged products in transit or storage.15

Recording and Controlling Instruments

BROWN INSTRUMENT CO., Wayne and Roberts Aves., Philadelphia 44, Pa. Catalogue 6707, on Brown rectangular-case thermometers and pressure gages.16

High Tensile-Strength Steel

UNITED STATES STEEL CORPORATION, 429 Fourth Ave., Pittsburgh 19, Pa. Catalogue containing complete data on the properties, fabrication, and application of the high tensile-strength steel "Cor-Ten."..17

Glossary of Terms Used in Plastic and Rubber Industries

B. F. GOODRICH CHEMICAL CO., Rose Bldg., Cleveland 15, Ohio. Twelve-page glossary of technical words, terms, and phrases used in the plastic and rubber industries...18

Carbide Drawing Dies

CARBOLOY COMPANY, INC., Detroit, Mich. Booklet D-120, describing actual performance of carbide dies in drawing highly abrasive beryllium copper and other deep-drawing applications.19

Patent Research Data

INVENTION, INC., Munsey Bldg., Washington 4, D. C. Pamphlet entitled "Summary of Services," describing different methods of obtaining technical information from patents.20

High-Speed Drills

REPUBLIC DRILL & TOOL CO., 322 S. Green St., Chicago 7, Ill. Bulletin RM-1, containing complete information on the new Republic line of mechanics' length high-speed drills designed to reduce vibration.21

Surface Grinding Wheels

BLANCHARD MACHINE CO., 64 State St., Cambridge, Mass. Booklet containing data on the best type of grinding wheel to use on Blanchard surface grinders for different kinds of work.22

Aircraft-Testing Equipment

HYDRAULIC MACHINERY, INC., 12825 Ford Road, Dearborn, Mich. Catalogue containing data on testing equipment for the hydraulic systems of aircraft.23

Air Compressors

WORTHINGTON PUMP & MACHINERY CORPORATION, Harrison, N. J. Bulletins H-620-B26 and H-620-M13 covering the new line of "Air King" air compressors.24

Flexible-Shaft Equipment

WYZENBEEK & STAFF, INC., 838 W. Hubbard St., Chicago 22, Ill. Folder on the Wyzenbeek line of flexible-shaft machines, high-speed grinders, tools, etc.25

Magnesium

HILLS-MCCANNA CO., 3025 North Western Ave., Chicago 18, Ill. Booklet entitled "Magnesium—Lightest of all Structural Metals," showing a variety of applications.26

Safety Die Jack

PERSSON MFG. CO., 2 Henry St., Bloomfield, N. J. Circular illustrating and describing the Persson safety die jack for rapidly separating and assembling die sets.27

Beryllium-Copper Springs

GIBSON ELECTRIC CO., 8350 Franks-town Ave., Pittsburgh 21, Pa. Bulletin B-61, on beryllium-copper electrical contact springs.28

Gear and Motor Drives

LIMA ELECTRIC MOTOR CO., Lima, Ohio. Bulletin illustrating and describing Lima gearshift drives, electric motors, pedestal grinders, and polishing and buffing lathes.29

Couplings

PHILADELPHIA GEAR WORKS, INC., Erie Ave. and G St., Philadelphia 34, Pa. Bulletin 150, covering the line of Philadelphia couplings.30

Air Motors

BELLOWS SENACON CO., 798 N. Main St., Akron 10, Ohio. Bulletin descriptive of Bellows air motors for pulling, pushing, lifting, etc.31

Industrial Furnaces

DEMPEY INDUSTRIAL FURNACE CORPORATION, Springfield 1, Mass. Bulletin 3-1A23, on Dempsey box and pot type gas or oil furnaces.32

Draw-In Collets

HARDINGE BROTHERS, INC., Elmira, N. Y. Bulletin 46, listing Hardinge draw-in collets for various types of lathes and millers.33

Stock Flange List

KROPP FORGE CO., 5301 W. Roosevelt Road, Chicago 50, Ill. Stock Flange List No. 225, covering forged-steel flanges.34

Dust-Collecting Equipment

AGET-DETROIT CO., Ann Arbor, Mich. Bulletin entitled "Dustkops Stop Dust and Lint from Polishing and Buffing."35

Used Machine Tools

J. L. LUCAS & SON, INC., Bridgeport 5, Conn. List of late model used machine tools.36

To Obtain Copies of New Trade Literature

listed in this section (without charge or obligation), fill in below the publications wanted, using the identifying number at the end of each descriptive paragraph; detach and mail within three months of the date of this issue (December, 1946) to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

No. 36	No. 13	No. 15	No.	No.	No.	No.	No.	No.	No.
--------	--------	--------	-----	-----	-----	-----	-----	-----	-----

NAME..... POSITION OR TITLE.....
[This service is for those in charge of shop and engineering work in manufacturing plants]

FIRM.....

BUSINESS ADDRESS.....

CITY..... STATE.....

**"You can probably
machine it in *ONE*
operation . . .**



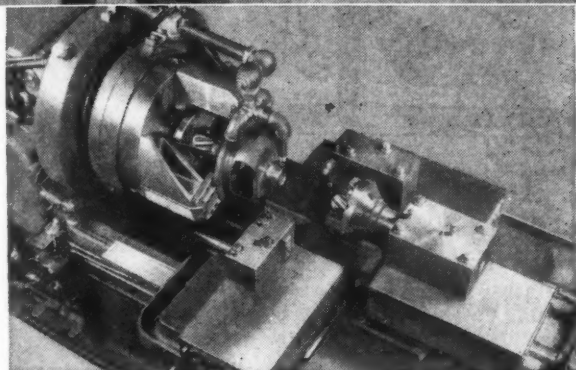
on a

Gisholt Simplimatic!"

Surprised? It's not at all unusual for a Gisholt Simplimatic to machine the front and back faces as well as inside and outside portions of a part simultaneously. Twenty to thirty cuts are frequently made at one time on complicated parts, and to close tolerances.

This is because the large platen table of the Simplimatic permits the use of a larger number of slides placed most advantageously with respect to the job the tools are to do. You are free from the usual restrictions.

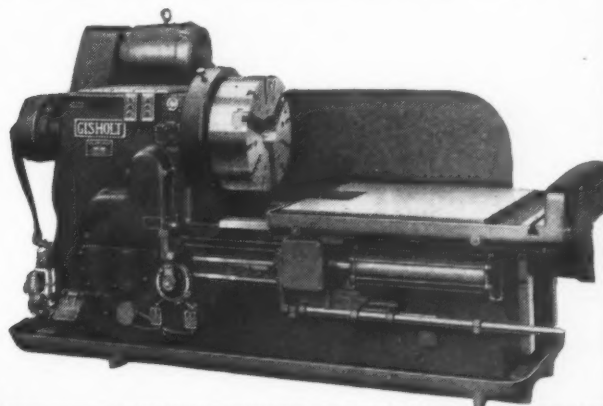
Gisholt can arrange the tooling and ship you the complete Simplimatic—production tested on your job—ready to work. Send the blueprints and specifications of parts you produce in quantity and learn what this modern automatic lathe can do for you.



FRONT AND BACK—ONE OPERATION. *Two similar sets of tools—one on center slide and the other on a back boring attachment through the spindle—rough drill, turn the outside, face and chamfer hubs on both ends of differential carrier while rear slide turns two diameters and front slide faces outer flange. Cutting time: 1 1/4 minutes.*



TEN TOOLS *finish ten surfaces on this aluminum aircraft engine crankcase in 3 minutes and 10 seconds. One man and two Simplimatics handle the work formerly done by ten men and ten other type machines.*



Look Ahead...Keep Ahead...with Gisholt

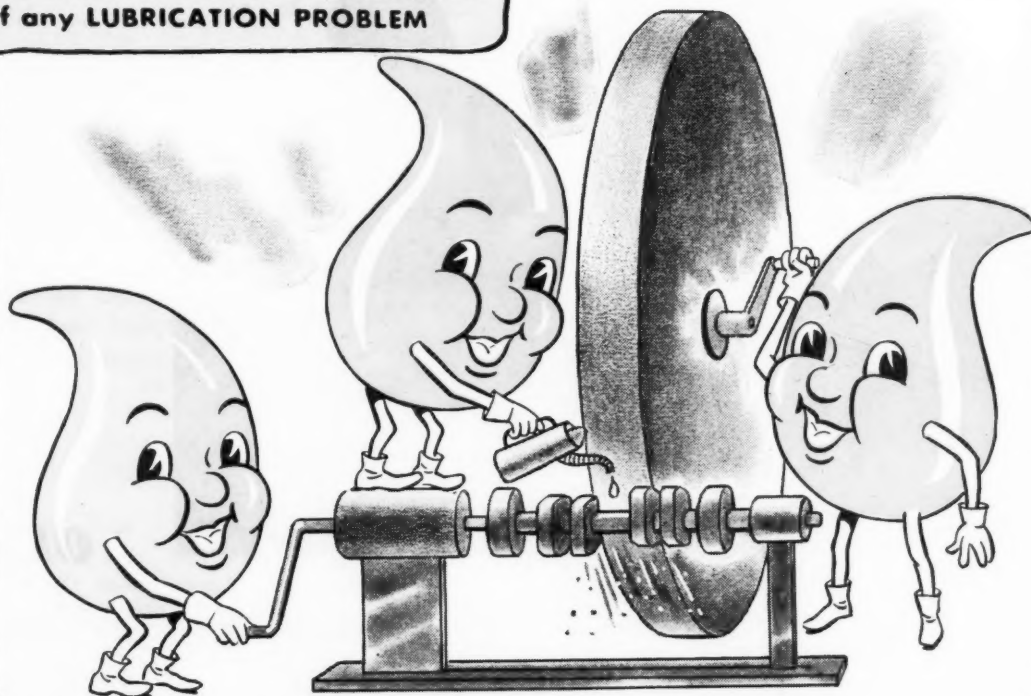


GISHOLT MACHINE COMPANY
1209 E. Washington Avenue, Madison 3, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



Call the
**SHELL LUBRICATION ENGINEER as
the FIRST STEP to the RIGHT SOLUTION
of any LUBRICATION PROBLEM**



SHELL GRINDING OIL PREVENTS RUSTING OF PRECISION-GROUND PARTS

PROBLEM: Manufacturer of tiny precision parts found he could get required finish only by using a combination of special wheels together with a special grinding oil which was lacking in protective properties. The special wheels were a nuisance, but the real problem was the quick rusting of parts finished with this grinding oil.

SOLUTION: When the Shell Lubrication Engineer surveyed the problem, he suggested this test, which was made:

1. A grinder, equipped with standard wheels, was used with Shell Virgo Oil as the grinding fluid to produce a handful of the parts in question.
2. These parts were then set aside... the coating of Shell Virgo Oil their only protection against rust.

At the end of two months, no sign of rusting could be found. The manufacturer pronounced the finish obtained with standard wheels satisfactory... and ordered Shell Virgo Oil for all grinders.

CONCLUSION: It pays to consult the Shell Lubrication Engineer, regardless of the nature or size of your lubricating problem. For informative literature on Metal-Working oils, write Shell Oil Company, Incorporated, 50 West 50th Street, New York 20, N. Y.; or 100 Bush Street, San Francisco 6, California.

SHELL METAL-WORKING OILS

For every metal...for every operation



MACHINERY'S DATA SHEETS 575 and 576

CHECKING EXTERNAL GEAR SIZES BY MEASUREMENT OVER WIRES—1

Even Numbers of Teeth					
No. of Teeth	Pressure Angle				
	14½°	17½°	20°	25°	30°
6	8.1298	8.1442	8.1600	8.2003	8.2504
8	10.1535	10.1647	10.1783	10.2155	10.2633
10	12.1712	12.1796	12.1914	12.2260	12.2722
12	14.1851	14.1910	14.2013	14.2338	14.2785
14	16.1964	16.2001	16.2091	16.2397	16.2833
16	18.2058	18.2076	18.2154	18.2445	18.2871
18	20.2137	20.2138	20.2205	20.2483	20.2902
20	22.2205	22.2190	22.2240	22.2515	22.2927
22	24.2265	24.2235	24.2286	24.2542	24.2949
24	26.2317	26.2275	26.2318	26.2566	26.2967
26	28.2363	28.2309	28.2346	28.2586	28.2982
28	30.2404	30.2339	30.2371	30.2603	30.2996
30	32.2441	32.2367	32.2392	32.2619	32.3008
32	34.2475	34.2391	34.2412	34.2632	34.3017
34	36.2505	36.2413	36.2430	36.2644	36.3026
36	38.2533	38.2433	38.2445	38.2655	38.3035
38	40.2558	40.2451	40.2460	40.2666	40.3044
40	42.2582	42.2468	42.2473	42.2675	42.3051
42	44.2604	44.2483	44.2485	44.2683	44.3057
44	46.2624	46.2497	46.2496	46.2690	46.3063
46	48.2642	48.2510	48.2506	48.2697	48.3068
48	50.2660	50.2522	50.2516	50.2704	50.3073
50	52.2676	52.2534	52.2525	52.2710	52.3078
52	54.2691	54.2545	54.2533	54.2716	54.3082
54	56.2705	56.2555	56.2541	56.2721	56.3086
56	58.2719	58.2564	58.2548	58.2726	58.3089
58	60.2731	60.2572	60.2555	60.2730	60.3093
60	62.2743	62.2580	62.2561	62.2735	62.3096
62	64.2755	64.2587	64.2567	64.2739	64.3099
64	66.2765	66.2594	66.2572	66.2742	66.3102
66	68.2775	68.2601	68.2577	68.2746	68.3104
68	70.2785	70.2608	70.2582	70.2749	70.3107
70	72.2794	72.2615	72.2587	72.2752	72.3109
72	74.2803	74.2620	74.2591	74.2755	74.3111
74	76.2811	76.2625	76.2596	76.2758	76.3113
76	78.2819	78.2631	78.2600	78.2761	78.3115
78	80.2827	80.2636	80.2604	80.2763	80.3117
80	82.2834	82.2641	82.2607	82.2766	82.3119
82	84.2841	84.2646	84.2614	84.2768	84.3121
84	86.2847	86.2650	86.2614	86.2771	86.3123
86	88.2854	88.2655	88.2617	88.2773	88.3125
88	90.2860	90.2659	90.2620	90.2775	90.3126

The dimensions given in this table are for 1 diametral pitch gears and wires of 1.68-inch diameter. For checking gears of any other pitch, divide the dimensions given by the diametral pitch and use wires having a diameter equal to $\frac{1.68}{\text{diametral pitch}}$

MACHINERY'S Data Sheet No. 575, December, 1946

Compiled by The Van Keuren Co. Boston, Mass.

CHECKING EXTERNAL GEAR SIZES BY MEASUREMENT OVER WIRES—2

Even Numbers of Teeth					
No. of Teeth	Pressure Angle				
	14½°	17½°	20°	25°	30°
90	92.2866	92.2662	92.2624	92.2777	92.3127
92	94.2872	94.2666	94.2627	94.2779	94.3129
94	96.2877	96.2670	96.2630	96.2780	96.3130
96	98.2882	98.2673	98.2632	98.2782	98.3131
98	100.2887	100.2677	100.2635	100.2784	100.3132
100	102.2892	102.2680	102.2638	102.2785	102.3134
102	104.2897	104.2683	104.2640	104.2787	104.3135
104	106.2901	106.2685	106.2642	106.2788	106.3136
106	108.2905	108.2688	108.2644	108.2789	108.3137
108	110.2910	110.2691	110.2645	110.2791	110.3138
110	112.2914	112.2694	112.2647	112.2792	112.3139
112	114.2918	114.2696	114.2649	114.2793	114.3140
114	116.2921	116.2699	116.2651	116.2794	116.3141
116	118.2925	118.2701	118.2653	118.2795	118.3142
118	120.2929	120.2703	120.2655	120.2797	120.3142
120	122.2932	122.2706	122.2658	122.2798	122.3143
122	124.2936	124.2708	124.2660	124.2799	124.3144
124	126.2939	126.2710	126.2662	126.2800	126.3145
126	128.2941	128.2712	128.2664	128.2801	128.3146
128	130.2945	130.2714	130.2666	130.2802	130.3146
130	132.2948	132.2716	132.2668	132.2803	132.3147
132	134.2951	134.2718	134.2669	134.2804	134.3147
134	136.2954	136.2720	136.2671	136.2805	136.3148
136	138.2957	138.2722	138.2673	138.2806	138.3149
138	140.2960	140.2724	140.2675	140.2807	140.3149
140	142.2962	142.2725	142.2676	142.2808	142.3150
142	144.2965	144.2727	144.2677	144.2808	144.3151
144	146.2967	146.2729	146.2679	146.2809	146.3151
146	148.2970	148.2730	148.2681	148.2810	148.3152
148	150.2972	150.2732	150.2682	150.2811	150.3152
150	152.2974	152.2733	152.2683	152.2812	152.3153
152	154.2977	154.2735	154.2684	154.2812	154.3153
154	156.2979	156.2736	156.2685	156.2813	156.3154
156	158.2981	158.2737	158.2686	158.2813	158.3155
158	160.2983	160.2739	160.2687	160.2814	160.3155
160	162.2985	162.2740	162.2688	162.2815	162.3155
162	164.2987	164.2741	164.2689	164.2815	164.3156
164	166.2989	166.2742	166.2690	166.2816	166.3156
166	168.2990	168.2743	168.2691	168.2816	168.3157
168	170.2992	170.2744	170.2692	170.2817	170.3157
170	172.2994	172.2745	172.2693	172.2817	172.3158
180	182.3003	182.2752	182.2699	182.2820	182.3160
190	192.3011	192.2759	192.2704	192.2823	192.3161
200	202.3018	202.2761	202.2706	202.2825	202.3163
300	302.3063	302.2719	302.2719	302.2839	302.3173
400	402.3087	402.2804	402.2730	402.2845	402.3178
500	502.3101	502.2813	502.2736	502.2850	502.3181

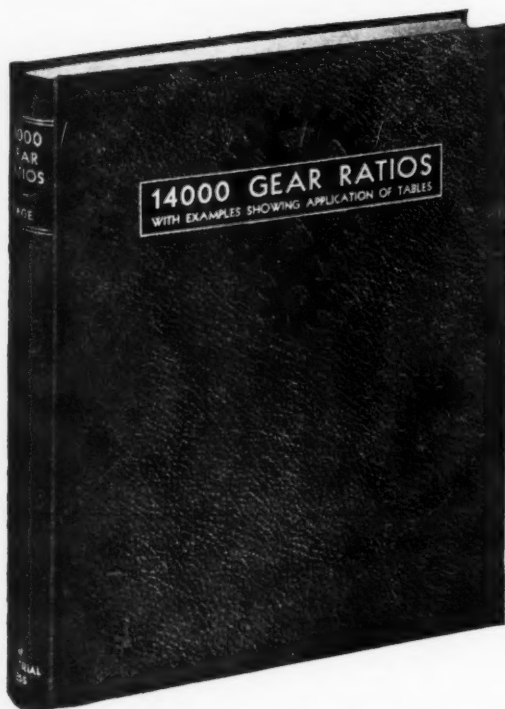
These data for 1 diametral pitch gears and 1.68-inch diameter wires are based on the Buckingham formulas for measurement of external spur gears over wires.

MACHINERY'S Data Sheet No. 576, December, 1946

Compiled by The Van Keuren Co. Boston, Mass.

14000 Gear Ratios

With Examples Showing Use of Tables



This book contains about 400 pages of tabulated gear ratios and examples—14000 two-gear, and millions of possible four-gear combinations. The tables are presented in both common fractional and decimal forms and are divided into four main sections. These sections are arranged differently to facilitate solving, by simple direct methods, any type of gear ratio problem likely to arise.

SECTION 1—Common Fractional Ratios and Decimal Equivalents.

SECTION 2—Decimal Ratios, Logs and Equivalent Pairs of Gears.

SECTION 3—Total Number of Teeth with Equivalent Gear Pairs and Ratios.

SECTION 4—Numbers and Equivalent Gear Factors.

Book is 8-1/2 x 11 Inches. Price, \$5 copy

THE INDUSTRIAL PRESS, 148 Lafayette Street, New York 13, N. Y.

Gear Design Simplified



This book of working rules and formulas for designer and shop man, deals with spur gears, internal gears, straight-tooth and spiral-bevel gears, single- and double-helical gears, worm gears, gear ratios (including transmissions of the planetary type) and the power-transmitting capacity of gears.

All gear problems are presented in simple chart form. These 110 charts, with 201 drawings illustrating all kinds of gear problems, are easy to use and you can locate quickly whatever rule or formula is desired. Worked-out examples of gear design show exactly how all rules (or the formulas, if preferred) are actually applied in obtaining the essential dimensions, angles, or other values. Price \$3 copy.

Size 8-1/2 x 11 Inches

THE INDUSTRIAL PRESS, 148 Lafayette Street, New York 13, N. Y.

News of the Industry

Illinois and Indiana

JOSEPH T. RYERSON & SON, INC., Chicago, Ill., announces the completion of an addition to the structural shop office building of its Chicago plant, resulting in added convenience and improved service to customers. The new construction, which is an extension to the two-story steel and brick structure located at the corner of 18th and Rockwell Sts., provides 6500 additional square feet of floor space. All branches of the structural department, some of which were formerly housed in the company's general offices at 16th and Rockwell Sts., are now located in the newly enlarged building.

WARCO SALES Co., representing the Warren City Mfg. Co., a subsidiary of the Federal Machine & Welder Co., Warren, Ohio, builder of Warco presses and press brakes, has opened central district sales and service headquarters at 9 S. Clinton St., Chicago 6, Ill. The Chicago office will serve the territory including Illinois, Iowa, Minnesota, and northwestern Indiana. NORMAN M. RAMLER is district sales manager in charge of the Chicago office. GILBERT R. KRUG and CECIL E. NOVINGER are sales engineers at the new office.

JAS. P. MARSH CORPORATION, 2073 Southport Ave., Chicago 14, Ill., manufacturer of indicating and recording gages and thermometers and heating specialties, announces plans for the immediate construction of a new factory and office building to be erected on a five-acre tract of land at Howard St., and St. Louis Ave. in Skokie, Ill., a suburb of Chicago. The building will be a one-story unit, and will cover an area of approximately 100,000 square feet.

GEORGE P. TORRENCE, executive vice-president of the Link-Belt Co., Chicago, Ill., since July, 1946, has been made president of the company, succeeding WILLIAM C. CARTER, who has retired. Mr. Torrence has been connected with the Link-Belt organization for twenty-five years. Mr. Carter will continue to serve the company as a director and chairman of the executive committee of the board.

AMERICAN MANGANESE STEEL DIVISION OF AMERICAN BRAKE SHOE Co., Chicago Heights, Ill., announces the following appointments: A. R. SITTING, manager of manganese steel sales at Chicago Heights, Ill.; E. L. QUINN, assistant vice-president in charge of welding products at Chicago Heights; and E. J. NIST, assistant vice-president, with offices at 230 Park Ave., New York City.

THEODORE S. SEE has been appointed first vice-president and general manager of the LaSalle Steel Co., Chicago 80, Ill., and A. FRANK GOLICK has been made vice-president in charge of sales of the company. Both men have been connected with the LaSalle Steel Co. for a number of years.

NATIONAL MERCHANDISERS, 28 E. Huron St., Chicago 11, Ill., announces a marketing service for new inventions, designed to help the small or average inventor at every step, from the beginning of a new idea until the invention has been properly developed for manufacturing operations.

WARD R. SCHAFER has been named general sales manager of Ideal Industries, Inc., Sycamore, Ill., manufacturer of electrical and mechanical industrial equipment. He was formerly vice-president in charge of sales for the Edison General Electric Appliance Co. in Chicago.

DI MACHINE CORPORATION, DIVISION OF THE DIEBEL DIE & MFG. Co., manufacturer of the "Hi-Speed" automatic punch press, announces that it has recently completed a new factory at 2711 W. Irving Park Road, Chicago, Ill., which will provide much needed additional space.

ROBERT L. BURKE, for eight years mechanical engineer with the Indianapolis Division of the RCA Mfg. Co., has been appointed midwestern sales representative of the LaSalle Engineering Co., 628 W. Lake St., Chicago, Ill.

CLYDE B. COLWELL has been appointed special representative for the stainless steels made by the Jessop Steel Co., Washington, Pa. He will make his headquarters at the company's Chicago offices at 311 S. Green St.

P. J. AQUILINO has been appointed assistant manager of the Washington branch of the Ahlberg Bearing Co., Chicago, Ill., and HENRY J. SHUSTER has been made assistant manager of the Philadelphia branch.

AUTOMOTIVE MAINTENANCE MACHINERY Co., 2100 Commonwealth Ave., North Chicago, Ill., has changed its name to AMMCO TOOLS, INC. No change in organization, management, or personnel has been made.

KELLY REAMER Co., Cleveland 1, Ohio, has appointed THOMAS C. BARBER, 140 N. Dearborn St., Chicago 2, Ill., exclusive sales and engineering representative for the company in the state of Wisconsin.

R. W. SHARP has been appointed district manager and sales engineer of the new office of the Lincoln Electric Co., Cleveland, Ohio, located at 3343 Central Ave., Indianapolis, Ind. Mr. Sharp returns to the Lincoln Electric Co. after three years' service in the Navy as a welding engineer.

Maryland and District of Columbia

FRANK J. KOHUT, formerly sales manager and chief of development of the C. M. Kemp Mfg. Co., Baltimore, Md., has been advanced to the post of general manager. The company manufactures equipment for industrial process heating, gas mixing, atmosphere generation, and moisture control.

RUSSELL P. PROFFITT, since 1933 Chicago divisional manager of the Timken Roller Bearing Co., Canton 6, Ohio, has been transferred to the Washington, D. C., office as district manager.

Michigan

MARSHALL M. SMITH was elected president of the E. W. Bliss Co., Detroit, Mich., at a recent meeting of the board of directors, succeeding D. S. HARDER, who assumed the duties of vice-president in charge of operations of the Ford Motor Co., Dearborn, Mich., on December 1. Mr. Smith has been connected with the Bliss organization since March, 1945, and was formerly vice-president. He is also a director of the company. Mr. Harder will continue to serve as a director and as chairman of the board of the E. W. Bliss Co.



Marshall M. Smith, Newly Elected President of the E. W. Bliss Co.



Walter S. Praeg, Recently Elected President of the National Broach & Mch. Co.



J. Irvin Schultz, New Vice-president of National Broach & Machine Co.

WALTER S. PRAEG has been elected president of the National Broach & Machine Co., Detroit, Mich., to fill the vacancy created by the recent death of Robert S. Drummond. J. IRVIN SCHULTZ was elected vice-president and treasurer. Mr. Praeg was formerly vice-president, and has been a member of the organization since its beginning. Mr. Schultz was previously treasurer.

A. E. CARTLIDGE, managing director of the Lakeside Engineering Works, (California-in-England, Ltd.), Longmoor Lake, Wokingham, Berkshire, England, manufacturers of machine tools and sheet-metal working equipment, is now in the United States on a business trip. While in this country, his address will be: Care of F. Gibson, 3204 Edgeworth Ave., Ferndale, Mich.

ABDITE GAUGE Co., Dearborn, Mich., announces a change in its organization set-up from a partnership to a corporation. HARMON SMITH and OLIVER LASZLO have been admitted to the firm. The company has recently enlarged its building and increased its operating facilities.

FORD MOTOR Co., Dearborn, Mich., is constructing a new home for the Johanson Gage Division of the company at Waterford, Mich. The new building will consist of a two-story annex to the present plant, and will provide 6480 square feet of additional space.

PAUL HACKER has been made operating manager of the Pioneer Engineering & Mfg. Co., Detroit, Mich. TED CAMPBELL has been added to the Pioneer staff as chief die engineer.

HERBERT R. WHITE, formerly an executive with the General Motors Corpora-

tion, has joined the Eclipse Counterbore Co., Detroit, Mich., in the capacity of general manager.

W. C. KEGG has joined the Progressive Welder Co., Detroit, Mich., manufacturer of resistance welding equipment, in the capacity of personnel director.

Minnesota and Wisconsin

GEOMETRIC TOOL Co., New Haven 15, Conn., announces the appointment of the following distributors for its line of threading tools and chasers: MINNEAPOLIS IRON STORE, 524 N. Washington Ave., Minneapolis 1, Minn.; and WARNER HARDWARE Co., 1423 Hennepin Ave., Minneapolis 3, Minn.

CLARENCE JOHNSON, for eighteen years research engineer with the Bailey Meter Co., Cleveland, Ohio, has established his own business as a research consultant on inventions and engineering developments in Beloit, Wis. His address is P. O. Box 378, Beloit.

New England

EASTERN ENGINEERING Co., New Haven, Conn., manufacturer of midjet pumps for industrial and laboratory use and of industrial mixing equipment, has been consolidated with the AUTOMATIC SIGNAL CORPORATION, East Norwalk, Conn. The new corporation will be known as EASTERN INDUSTRIES, INC., and will have headquarters at New Haven. No change will be made in the personnel of either of the operating divisions.

TORRINGTON Co., Torrington, Conn., announces the appointment of FRANK H.

MARCHAND as district manager in Chicago. The following district engineers have also been appointed: RAY G. O'CONNELL and C. R. RECOR, Chicago; RUELL D. DEAN, Torrington; FRED J. NORMAN, Cincinnati; and FRANK B. TIPPON, Los Angeles.

E. B. ANDREWS has been appointed sales manager of the O.K. Tool Co. division of Aerodynamic Research Corporation, Shelton, Conn., manufacturer of inserted-blade milling cutters, boring heads, and single-point tools.

OSCAR G. KNAPP, vice-president and treasurer of the Clark Bros. Bolt Co., Milldale, Conn., manufacturer of bolts, nuts, screws, and rivets, has been named president and treasurer to succeed the late Edwin S. Todd.

BRYANT CHUCKING GRINDER Co., Springfield, Vt., announces that all sales of the company's products through the Middle West are now being handled directly. W. M. SMITH has been appointed general sales manager, and A. E. STUBBS, foreign sales manager. The company also announces the opening of several new offices, one at 19003 Mendota and Seven-Mile Road West, Detroit, Mich., under the direction of L. C. GILCHRIST; another at 329 S. Wood St., Chicago, Ill., with THOMAS DETHEROW and WALTER AUGUSTENOVICH in charge; and a third at 10022 Carnegie Ave., Cleveland, Ohio, under the direction of ROBERT F. MANLEY.

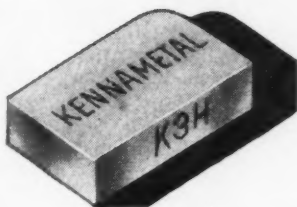
FAIRCHILD INDUSTRIES, INC., Burlington, Vt., has recently been organized as a wholly owned subsidiary of FAIRCHILD CAMERA & INSTRUMENT CORPORATION, Jamaica, N. Y., precision instrument manufacturer. The new company will engage in the manufacture, among other products, of an electric hand drill. SHERMAN M. FAIRCHILD has been elected chairman of the board, and JAMES S. OGBURY president and a director.

New York and New Jersey

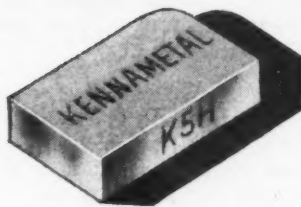
EUGENE SOMOFF has been appointed to the newly created post of technical service engineer with the American Standards Association, 70 E. 45th St., New York 17, N. Y. Mr. Somoff, who is an electrical engineer with wide experience in Russia, Belgium, Great Britain, and the United States, will collect and supply technical information concerning American standards and those of other countries.

GENERAL ELECTRIC Co., Schenectady, N. Y., has made plans for the construction of a huge \$20,000,000 factory for the manufacture of steam turbines and electric generators at Schenectady. The building will be 1290 feet long, with a frontage of 650 feet, and will cover approximately nineteen acres. Much new equipment will be installed.

IT PAYS TO KNOW *Your* KENNAMETAL GRADES!



Most crater-resistant Kennametal tool material—gives outstanding service for finishing or moderate cuts on carbon and alloy steels .30% carbon and higher. Also time- and money-saver for general use on soft steels containing less than .30% carbon, precision boring of steel where .004" feed or over is used, and for many milling jobs on steel. 92 Rockwell A hardness.



The hardest Kennametal tool material grade—specifically for solid tools used on precision boring of steel parts. Its high hardness, great resistance to cratering, and unusual strength can help you cut costs where fast, accurate work is essential. 93.2 Rockwell A hardness.



Strongest crater-resistant Kennametal tool material—saves tooling and production costs when taking rough cuts on carbon and alloy steel forgings, bar stock, etc., having carbon content of .30% and higher. Also outstanding for milling of steel at heavy chip loads. 91 Rockwell A hardness.



A very strong Kennametal tool material, particularly suitable for roughing cuts on steel castings. Its high resistance to abrasion and edge wear of sand inclusions makes possible exceptionally high rate production, and economical tooling costs. 91.5 Rockwell A hardness.



Highly resistant to edge wear—takes a good edge—a money-saving tool material for very light finishing cuts on steel and for precision boring with less than .004" feed. Ideally suited for tools requiring large nose radius or where tool must dwell without cutting. Excellent for milling, and very rough cutting of brass, bronze, and aluminum alloys. 92.3 Rockwell A hardness.



Reduces cost of machining cast iron. Extremely hard, straight tungsten carbide tool material having unusual strength. Holds keen edge, withstanding shock of interrupted cuts on rough, sandy, or chilled castings. Also outstanding for finishing and precision boring of cast iron. 92.2 Rockwell A hardness.

KENNAMETAL Blanks are now sold
in *Economical* "Package Lots."
For Prices and Particulars Send for Catalog 46



KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

W. HERBERT EVERITT has been made sales representative of Hydropress Inc., New York 22, N. Y., builder of hydraulic presses, rolling mills, and die-casting machines. Mr. Everitt's territory will include the states of Washington and Oregon and British Columbia. His headquarters are at 1743 First Ave., South, Seattle, Wash.

GENERAL ELECTRIC Co., Schenectady, N. Y., announces the establishment of a new aviation division with JOHN C. MILLER in charge. This will be divided into two main sections, namely, the Aircraft Accessories and Ordnance Division at Schenectady, with ROBERT A. AVERITT as manager; and the Aircraft Gas Turbine Division at Lynn, Mass., with E. S. THOMPSON as manager.

NED LANDIS, formerly a Lieutenant Commander in the U. S. Navy, has been named branch manager of the Syracuse, N. Y., office of the Allis-Chalmers Mfg. Co., Milwaukee, Wis., succeeding LEONARD R. REID. Before joining the Navy, Mr. Landis was associated with the Cincinnati office of Allis-Chalmers.

JAMES E. STEVENSON has been made manager of V-belt sales for the United States Rubber Co., Rockefeller Center, New York City.

FERRACUTE MACHINE Co., Bridgeton, N. J., has appointed the BERT CARPENTER Co., 208 Hanna Bldg., Birmingham, Mich., representative of the company in the Michigan territory. ROBERT S. BROWN, Box 158, Wilbraham, Mass., is covering the New England states.

DR. JOHN JOHNSTON has retired as director of the research laboratory of the United States Steel Corporation of Delaware, at Kearny, N. J., and has been succeeded by Dr. J. B. AUSTIN, assistant director.

Ohio

LODGE & SHIPLEY MACHINE TOOL Co., Cincinnati, Ohio, announces that the corporate name of the concern has been changed to the LODGE & SHIPLEY Co., due to expanding operations of the company. In addition to the original Machine Tool Division, the company now includes a Special Products Division which manufactures transmission units, special automotive parts, valves, and garden tractors. The Machine Tool Division has recently announced the acquisition of the product and patent rights for the sole use, sale, and application of the Duplimatic" contour control device from the Detroit Universal Duplicator Co., Detroit, Mich. This product will be manufactured in the future at the Cincinnati plant.

ALVIN F. GROLL has been placed in charge of sales in the Cleveland area of the mechanical and hydraulic presses and can-making machinery made by the

E. W. Bliss Co., Detroit, Mich. His headquarters will be at 1625 NBC Bldg., Cleveland, Ohio. During the past year, Mr. Groll has been design and sales engineer for the Mueller Engineering Co. Prior to that he was associated for twelve years with the Bliss organization in the same capacity.

J. T. MYERS has been elected vice-president in charge of sales and production of the Davey Compressor Co., Kent, Ohio. He has been a member of the Davey organization for five years, having served as assistant general manager during the past year.

GEORGE H. KAISER has been made district sales manager in charge of the Cleveland office of the Columbia Tool Steel Co., Chicago Heights, Ill. He will be located at 1640 St. Clair Ave., Cleveland 14, Ohio.

J. R. BAREFOOT, formerly plant engineer with the Federal Machine & Welder Co., Warren, Ohio, has been named executive assistant to H. A. STIX, executive vice-president and treasurer.

DEFIANCE MACHINE WORKS, Defiance, Ohio, has appointed the EDMUND BURKE Co., 3005 Detroit Ave., Toledo 10, Ohio, distributor for the company's line of machine tools in the northwestern Ohio area.

ROBERT F. OHMER has been appointed vice-president in charge of administration for the Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

Pennsylvania

HOMER A. GODDARD has been appointed assistant division manager in charge of industrial lubricating sales for the Pitts-

burgh Division of the Gulf Oil Corporation. He succeeds S. A. NEWMAN, who has been advanced to the position of chief turbine lubrication engineer.

MORRIS EVANS LEEDS, chairman of the board of the Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa., will be

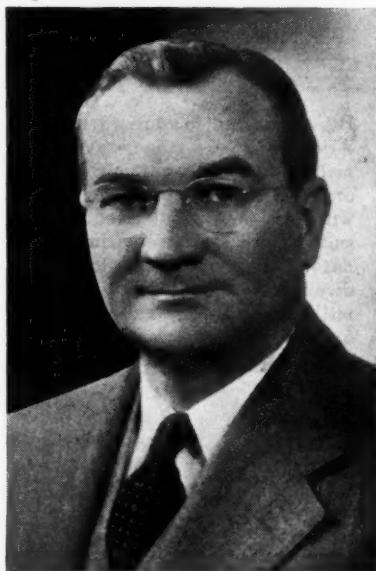


Morris E. Leeds, Recipient of the A.S.M.E. Medal

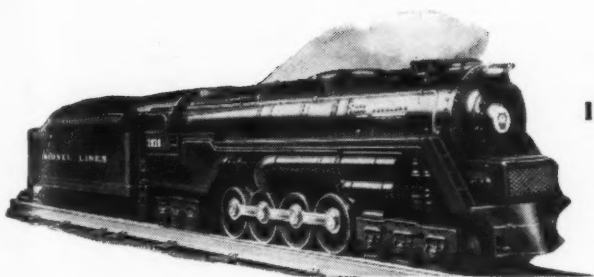
awarded the A.S.M.E. Medal, the highest honor of the American Society of Mechanical Engineers, at the annual meeting of the Society in New York, December 2 to 6. This medal is to be conferred on Mr. Leeds because of his "outstanding achievements in the invention and development of electrical and temperature measuring instruments and in the field of industrial relations." He was a pioneer in the development of instruments based on the null method of electrical measurement, and is the inventor of the Leeds automatically balanced bridge or potentiometer, which has developed into the well-known line of Micromax automatic indicating, recording, and controlling instruments. For this invention, Mr. Leeds was honored by the Franklin Institute in 1920. In the field of industrial relations, he organized and maintained an industrial system of employment stabilization in his own firm, and worked in many ways for the promotion of national economic planning, social security, and better industrial relations.

D. J. HASINGER has been appointed general manager of the Paul and Beekman Division of the Portable Products Corporation at Philadelphia, Pa., manufacturer of stamped and drawn metal parts.

CARBOLOY COMPANY, INC., Detroit, Mich., has appointed the RAUB SUPPLY Co., James and Mulberry Sts., Lancaster, Pa., distributor for the hard metal carbide



Homer A. Goddard, Assistant Division Manager, Industrial Lubricating Sales, for Gulf Oil



INDEPENDENT INVESTIGATOR TELLS HOW...

LIONEL

gives Assembly a clear track

"We use Phillips Screws on 27 different products," Lionel's chief engineer told the Peck Co. investigator, on another study of assembly savings made by prominent manufacturers using Phillips Screws.

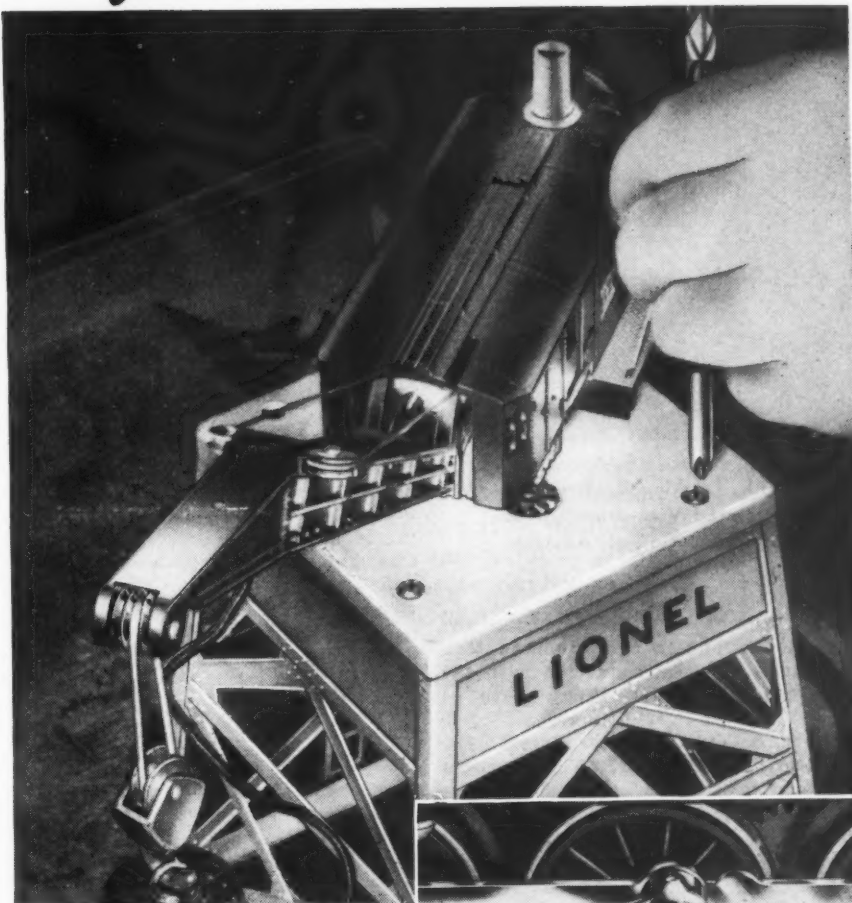
"PHILLIPS SCREWS ELIMINATE DRIVER SLIPS THAT USED TO COST A HALF MAN-HOUR EACH.

On most parts for Lionel locomotives, cars, and accessories, the finish is applied before assembly, so that a driver slip meant disassembling the product and either junking the part or stripping off the paint for refinishing. The time lost would average about 1/2 man-hour per slip. This time is saved since we switched to Phillips Screws.

"PHILLIPS SCREWS MAKE DIFFICULT ASSEMBLIES EASIER, FASTER. Fastening the motor base inside the body of a model locomotive is one example. Space here is too small to allow holding a screw with the fingers. In many assemblies the space is too small to permit using even a screw holding attachment. Phillips Screws stay on the driver tip, make it a trouble-free, one-hand job.

"FINE APPEARANCE OF PHILLIPS RECESS IMPROVES APPEARANCE, and contributes to smart, modern design that appeals to our customers."

A WEALTH OF ASSEMBLY INFORMATION is available to you in the full report of this independent investigator's findings at the Lionel plant. Send for this and other reports, on metal, wood, and plastic products. Use coupon.



Fastening motor base to structure of Lionel model 182 electric crane with Phillips Screws. One push with a spiral driver finds the thread and sends home the screw without driver skids, and assembly slow-down.

The small flush-type Phillips Screw in the eccentric pin on this Lionel locomotive shows how the ornamental Phillips recess adds to smart, realistic design.

PHILLIPS *Recessed Head* SCREWS

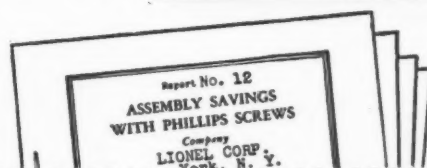
Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

American Screw Co.
Atlantic Screw Works
Atlas Bolt & Screw Co.
Central Screw Co.
Chandler Products Corp.
Continental Screw Co.
Corbin Screw Div. of
American Hdwe. Corp.
The H. M. Harper Co.
International Screw Co.
Lamson & Sessions Co.

26 SOURCES

Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.

Pheell Manufacturing Co.
Reading Screw Co.
Russell Burdall & Ward
Bolt & Nut Co.
Sevill Manufacturing Co.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Stronghold Screw Products, Inc.
Wolverine Bolt Company



Phillips Screw Mfrs., c/o Horton-Noyes
2300 Industrial Trust Bldg., Providence, R. I.

Send me reports on Assembly Savings with Phillips Screws.

Name

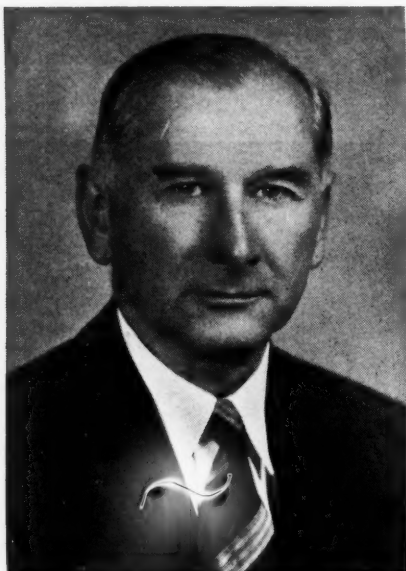
Company

Address

M-12

products made by the company. **WILLIAM H. TAYLOR & Co., Inc.**, 256 Hamilton St., Allentown, Pa., have been appointed distributors for the company in the Allentown-Bethlehem-Easton area of Pennsylvania.

FRANK L. MAGEE, general production manager for the Aluminum Co. of America, Pittsburgh 19, Pa., has been



Frank L. Magee, Recently Appointed Vice-president of Aluminum Co. of America

made a vice-president of the company. He will continue in his present duties. Mr. Magee has been connected with the organization for nearly thirty years.

METAL & THERMIT CORPORATION, 120 Broadway, New York 5, N. Y., announces the opening of a new sales office in the Land Title Building, Broad and Chestnut Sts., Philadelphia, Pa., for handling the sale of Murex arc-welding electrodes. **C. B. COOPER**, from the New York sales staff, will have charge of the new office, assisted by **J. G. STRAUB**.

ELMER A. MULSON, for the last ten years sales engineer with the Barney Machinery Co., of Pittsburgh, Pa., has been named manager of the Pittsburgh district office of the Baldwin Locomotive Works, Philadelphia, Pa. His office is in the Union Trust Building.

JAMES P. GILL, vice-president of the Vanadium-Alloys Steel Co., Latrobe, Pa., was awarded the honorary degree of Doctor of Engineering by the University of Missouri at the seventy-fifth anniversary of the founding of the Missouri School of Mines and Metallurgy.

HARRY W. BEARFOOT has been appointed a representative of Kennametal, Inc., Latrobe, Pa., in the Philadelphia area, with headquarters at 3701 N. Broad St.

Texas and Tennessee

H. B. LILLEY, development engineer on alloy mechanical tubing for the Timken Roller Bearing Co., Canton 6, Ohio, has recently been appointed district manager of the Steel and Tube Division of the company, with headquarters in Houston, Tex.

CUTLER-HAMMER, Inc., Milwaukee, Wis., manufacturer of electric motor control and allied products, has established a new district sales territory at 715-A No. Ervay St., Dallas, Tex. **E. K. ANDERSON** will have charge of the new sales district.

ALBERT R. KNAUSS, formerly of the Tulsa office of the Allis-Chalmers Mfg. Co., Milwaukee, Wis., has been named manager at Memphis, Tenn.

* * *

New Officers of the National Tool and Die Manufacturers Association

At the annual convention of the National Tool and Die Manufacturers Association, held in Chicago during the latter part of October, the following officers were elected for the coming year:

President, **Willis G. Ehrhardt**, managing partner of the Ehrhardt Tool & Machine Co., St. Louis, Mo.; first vice-president, **William R. White, Jr.**, vice-president of the Midwestern Tool Co., Chicago, Ill., and president of the Tool and Die Institute in Chicago; second vice-president, **J. J. Kohl**, of the International Tool Co., Dayton, Ohio; treasurer, **Herbert F. Jahn**, president of the B. Jahn Mfg. Co., New Britain, Conn.; and secretary, **John H. Benetz**, Bridge Tool & Die Works, Philadelphia, Pa.



Willis G. Ehrhardt, New President of National Tool and Die Manufacturers Association

Coming Events

DECEMBER 2-4—National Air Transport Engineering Meeting of the **SOCIETY OF AUTOMOTIVE ENGINEERS** at the Edgewater Beach Hotel, Chicago, Ill. Secretary and general manager, **John A. C. Warner**, 29 W. 39th St., New York 18, N. Y.

DECEMBER 2-6—Annual meeting of the **AMERICAN SOCIETY OF MECHANICAL ENGINEERS** in New York City. **Clarence E. Davies**, secretary, 29 W. 39th St., New York 18, N. Y.

DECEMBER 2-7—SEVENTEENTH NATIONAL POWER SHOW at Grand Central Palace, New York. Further information can be obtained from the manager, **Charles F. Roth**, Grand Central Palace, New York 17, N. Y.

DECEMBER 9-11—Annual meeting of the **SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS** at the Hotel New Yorker, New York, N. Y. For further information, address the Society at P. O. Box 168, Cambridge 39, Mass.

JANUARY 14-17, 1947—NATIONAL MATERIALS-HANDLING EXPOSITION at the Public Auditorium, Cleveland, Ohio. Chairman of exposition committee, **Edwin J. Heimer**, president of Barrett-Cravens Co., Chicago, Ill.

JANUARY 23-26, 1947—Second conference and exhibit of the **LOW-PRESSURE DIVISION OF THE SOCIETY OF THE PLASTICS INDUSTRY, Inc.**, at the Edgewater Beach Hotel, Chicago, Ill. For further information, address the Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y.



William R. White, Jr., First Vice-president of Tool and Die Manufacturers Association

Sidney Lathes

present modern units of **CONSTRUCTION**

Check these units and see for yourself why you can depend on Sidney Lathes for power—precision and production.

The continuous tooth Herringbone geared head is an exclusive feature of Sidney Lathes providing a smooth flow of power under strenuous production conditions.

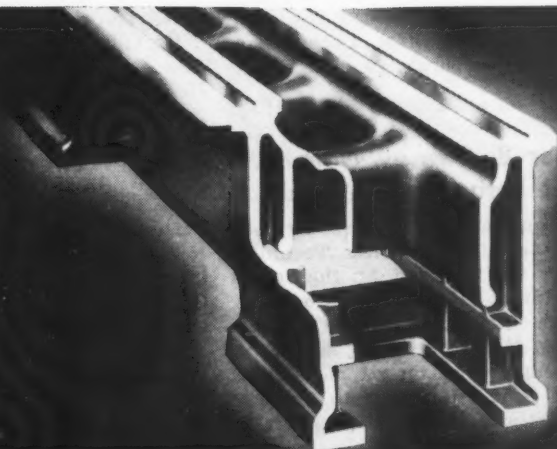
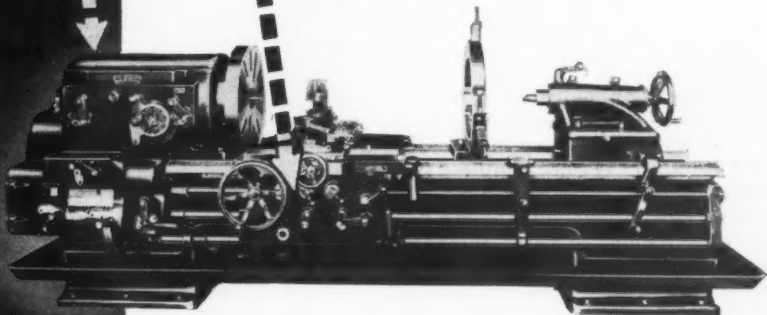
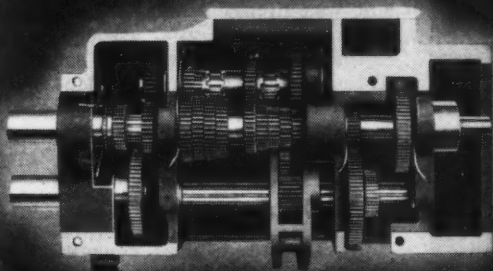
The Quick Change Gear Box is a versatile unit providing forty-eight thread and feed changes. It is fully enclosed and tongued so that it may be securely bolted to the bed.

The apron is double walled to provide support on both ends of heat treated and ground shafts on which alloy steel gears are mounted.

All controls are conveniently located for ease of operation and quick manipulation.

The bed is of double wall construction and amply cross girted to provide the utmost in rigidity and accuracy.

Full descriptive bulletins on all sizes available.



FEBRUARY 24-28, 1947—Spring meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS at the Benjamin Franklin Hotel, Philadelphia, Pa. Secretary, C. L. Warwick, 1916 Race St., Philadelphia 3, Pa.

MARCH 17-19, 1947—CHICAGO PRODUCTION SHOW AND CONFERENCE in the Exhibition Hall of the Stevens Hotel, Chicago, Ill., under the auspices of the Chicago Technical Societies Council, 53 W. Jackson Blvd., Chicago 4, Ill.

APRIL 29 - MAY 1, 1947 — INDUSTRIAL PACKAGING AND MATERIALS-HANDLING EXPOSITION at Hotel Sherman, Chicago, Ill., sponsored by the Industrial Packaging Engineers' Association of America, 134 S. La Salle St., Chicago 3, Ill.

MAY 5-11, 1947—NATIONAL PLASTICS EXPOSITION at the Coliseum, Chicago, Ill., under the auspices of the Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y.

JUNE 16-20, 1947—Annual meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS at the Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary, C. L. Warwick, 1916 Race St., Philadelphia, Pa.

* * *

Motion Picture on Steel Making

A fifteen-minute motion picture entitled "Melting of Huron Die Steel" has been produced by the Allegheny Ludlum Steel Corporation at the company's Dunkirk, N. Y., plant. This is the first of a series of pictures designed to tell the story of tool steel from its beginning through to the finished product. The present film shows graphically changes occurring during a heat within the walls of an electric arc furnace and reveals what the human eye never has been able to observe—the true color of the molten steel and slag. Animated diagrams are used to describe the melting process from the moment the scrap is placed in the furnace until the pure stainless steel is poured into the ladle.

Another new Allegheny Ludlum film entitled "Corrosion" explains the mechanism of corrosive attack and the development of stainless steels. These films are available free of charge for showing to technical and lay audiences. Further information can be obtained from the Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh, Pa.

* * *

Warner & Swasey Donates Turret Lathe to University

The re-equipment of the war-stripped University of Delft, Dutch Technical University, was assisted by the recent gift of a turret lathe by the Warner & Swasey Co., Cleveland, Ohio. The lathe will be used in the University laboratory as an example of advanced mechanical design, a production tool to produce needed equipment, and an operator training machine.

Obituaries

Edd C. Oliver

Edd C. Oliver, president of the Oliver Instrument Co., Adrian, Mich., died on November 15 at the age of seventy. He had been in failing health for several years. Mr. Oliver was born on December 3, 1875, in Indianapolis, Ind., and graduated from Purdue University in 1898. He received a Master's Degree from the University of Illinois in 1900, after which he taught mechanical engineering at that university and at the University of Minnesota for eight years. In 1913, he established a machine and tool building business in Detroit and moved to Adrian two years later.

Mr. Oliver was widely known in the engineering field and the machine-building industry for his designing ingenuity. He invented and developed all of the products manufactured by his concern, such as the Oliver filing or diemaking machine, twist drill pointer, face mill



Edd C. Oliver

grinders, tools and cutters, tap grinders, and tool bit grinders, and also designed numerous machines of the high-production type for automobile companies.

Mr. Oliver was a member of the American Society of Mechanical Engineers. He is survived by his wife.

Walter A. Ridings

Walter A. Ridings, president of the Porter-Cable Machine Co., Syracuse, N. Y., since 1915 and long a leading industrialist in Syracuse, died on October 17 at his home in that city after an illness of about five months, at the age of seventy-three years. Mr. Ridings went to Syracuse in 1890, and obtained a position as bookkeeper for the Syracuse Supply Co., later serving as treasurer, secretary, and



Photo Bachrach

Walter A. Ridings

vice-president of the company. For several years he was president of the Manufacturers Association of Syracuse. He was active in many civic movements, and was highly esteemed by all those with whom he was associated. Mr. Ridings leaves a wife, a son, D. J. Ridings, who is vice-president of the Porter-Cable Machine Co., and a daughter.

Dr. Sanford A. Moss

Dr. Sanford A. Moss, consulting engineer in the Aircraft Gas Turbine Division of the General Electric River Works, Lynn, Mass., and famous for his pioneer work on aircraft superchargers and gas turbines, died suddenly of a heart attack at his home in Lynn, Mass., on November 10. He was seventy-four years of age. After a long and distinguished career, he went into what he thought was retirement in 1938, at the age of sixty-five. In London the day of the Munich pact, he returned and voluntarily resumed his work as a consulting engineer for General Electric.

He received the 1940 Collier Aviation Trophy jointly with the Army Air Forces for "outstanding success in high altitude flying by the development of the turbo-supercharger." Dr. Moss also received one of General Electric's Coffin awards for his supercharger work. In January, 1944, he was awarded the Sylvanus Albert Reed Award from the Institute of Aeronautical Sciences.

Dr. Moss also devoted much attention to a system for automatic control by the pilot of an airplane's power plant, so that the pilot could devote his entire attention to fighting.

THOMAS MORRISON, a director of the International Nickel Co., of Canada, Ltd., and a former director of the United States Steel Corporation, died at his home in Spring Lake, N. J., on



THE MOST IMPORTANT TAP NEWS IN 25 YEARS

"M-11" is an *exclusive* chrome-cobalt high speed steel, especially developed for Detroit taps. It provides four outstanding exclusive tapping advantages:

Higher abrasion resistance—less wear; longer tap life

Higher toughness with hardness—less chance of tooth breakage; less tooth chipping of the cutting edge

Higher red hardness—ability to tap efficiently at drill speeds or even higher

Higher torsional strength—greater resistance to twisting and breakage.

These are not idle claims. They are backed up by the performance, in all kinds of service, of hundreds of thousands of "M-11" taps produced prior to this announcement.

Typical is the statement of the Tool Engineer of one of the largest of metal working plants, that his organization has been unable to find any tap to match the "M-11" in performance.

"Of course", he says, "you have to give

some of the credit to the kind of tool engineering and accuracy that Detroit Tap puts into its tools. But if you add 'M-11' on top of that—you really have something!"

If you have not yet tried "M-11" taps, you have an eye-opener coming. They are now available at no extra cost—from stock—in practically all standard and many special sizes. Try them on your toughest jobs, if you wish. A complete catalog is available on request.

Request the visit of one of our service men. There is one in your area.

Write, wire, or phone today.

GROUND TAPS

•
THREAD MILLING CUTTERS

•
THREAD GAGES AND SPECIAL
THREADING TOOLS, MACHINES
AND CHECKERS



8432 Butler Ave. • Detroit 11, U. S. A.

"M-11" IS USED ALSO
IN ALL OF DETROIT'S THREAD
ROLLS, THREAD PLUG GAGES
AND THREAD MILLING CUTTERS



Robert S. Drummond, Founder of National Broach & Machine Co., Whose Obituary was Published in November MACHINERY

October 26. Mr. Morrison was born in Scotland on December 5, 1861. He served an apprenticeship as a machinist and engineer in Scotland and came to the United States in 1886. He had been a director of the International Nickel Co. since May, 1917.

* * *

With but few exceptions, all metals in the earth's make-up must pass through a casting process before they become useful to human beings; and all metals must be alloyed with one or more other metals before it is possible to realize their maximum mechanical properties.

New Books and Publications

HEAT-TREATING ALUMINUM ALLOYS. 144 pages, 6 by 9 inches. Published by the Reynolds Metals Co., Inc., Department 47, 2500 S. Third St., Louisville 1, Ky. Price, \$1.

Although aluminum alloys have risen to the ranks of the most important metals, little information on their heat-treatment has hitherto been available. This book has been prepared to provide information on the subject in a form readily usable by both the non-technical man and the trained technician. The first section explains in general the basic principles of metallurgy and the heat-treatment of aluminum alloys; the second section presents in brief tabular form the recommended thermal treatments for various aluminum alloys; while the third section contains a technical discussion of the various heat-treatments, as well as detailed information on possible difficulties and suggestions for overcoming them.

PRINCIPLES OF TOOL ENGINEERING. By Raymond R. Bloom. 234 pages, 6 by 9 inches. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price, \$2.40.

The important principles of tool engineering are described in this book in a simple manner to meet the needs of beginning students. Among the fundamental topics discussed are systems of production; interchangeability; dimensioning; the tool engineer's training, duties, and place in manufacturing; and basic machine tools. Recent advances dealing with methods of construction

and welding symbols are included. The text is especially adapted for use in vocational, trade extension, technical, and college work. The material presented has been tested out in the author's classes over a period of fifteen years.

DESIGN OF MOLDED ARTICLES. Published by the Society of the Plastics Industry, 295 Madison Ave., New York 17, N. Y. Price, \$1.

This is the sixth chapter of a technical handbook in course of preparation by the Society of the Plastics Industry, the individual chapters of which are being made available separately as completed. The present booklet discusses problems encountered in the design of molded articles under the following headings: Shrinkage; Radii and Fillets; Undercuts; Wall Thickness; Taper or Draft; Ribs; Bosses; Holes; Flash Lines; Surface Treatment; Molded Lettering; and Threads.

METALLIZING HANDBOOK (Fourth Edition). 86 pages. Published by the Metallizing Engineering Co., Inc., 38-14 Thirtieth St., Long Island City 1, N. Y. Price, \$2.

Data on the preparation of surfaces, metallizing technique and finishing procedure, corrosion resistance, specific gravity, hardness, bond strength, tensile strength, and relative shrinkage are presented in the fourth edition of this metallizing handbook. It is profusely illustrated with halftones, drawings, diagrams, charts, and graphs.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933,

of MACHINERY, published monthly at New York 13, N. Y., for October 1, 1946.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the state and county aforesaid, personally appeared Edgar A. Becker, who, having been duly sworn according to law, deposes and says that he is the treasurer of The Industrial Press, Publishers of MACHINERY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editors, managing editor, and business managers are: Publisher, The Industrial Press, 148 Lafayette Street, New York 13, N. Y.; Editor, Charles O. Herb; Consulting Editors, Erik Oberg and Franklin D. Jones; Business Managers, Robert B. Luchars, Edgar A. Becker, and Harold L. Gray. The address of all the foregoing is 148 Lafayette Street, New York 13, N. Y.

2. That the owners of 1 per cent or more of the total amount of stock are: The Industrial Press, Robert B. Luchars, Edgar A. Becker, Franklin D. Jones, Walter E. Robinson, Charles O. Herb, and Harold L. Gray, all of 148 Lafayette St., New York 13, N. Y.; Helena E. Oberg, 65 Eighty-second St., Brooklyn 9, N. Y.; Wilbert A. Mitchell, 28 Harlow Road, Springfield, Vt.; First National Bank & Trust Co. of Montclair and Robert B. Luchars, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; First National Bank & Trust Co. of Montclair and Leigh Roy Urban, Trustees (Beneficiaries unknown), Upper Montclair, N. J.; First National Bank & Trust Co. of Montclair and Kenneth D. Ketchum,

Trustees (Beneficiaries unknown), Upper Montclair, N. J.; Paterson Savings Institution, Trustee (Beneficiaries unknown), Paterson, N. J.; Robert Luchars Urban, 51 Ellery St., Cambridge 38, Mass.

3. That the known bondholders, mortgagees, and other security holders are: Charlotte B. Baldwin, 420 Clinton Ave., Brooklyn, N. Y.; Robert B. Luchars, John Connolly, Franklin D. Jones, and Louis Pelletier, all of 148 Lafayette St., New York 13, N. Y.; Elizabeth Y. Urban, 163 Western Drive, Longmeadow 6, Mass.; Helen L. Ketchum, 231 King St., Cohasset, Mass.; Wilbert A. Mitchell, 28 Harlow Road, Springfield, Vt.; and Henry V. Oberg, 1317 Hillcrest Road, Lancaster, Pa.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

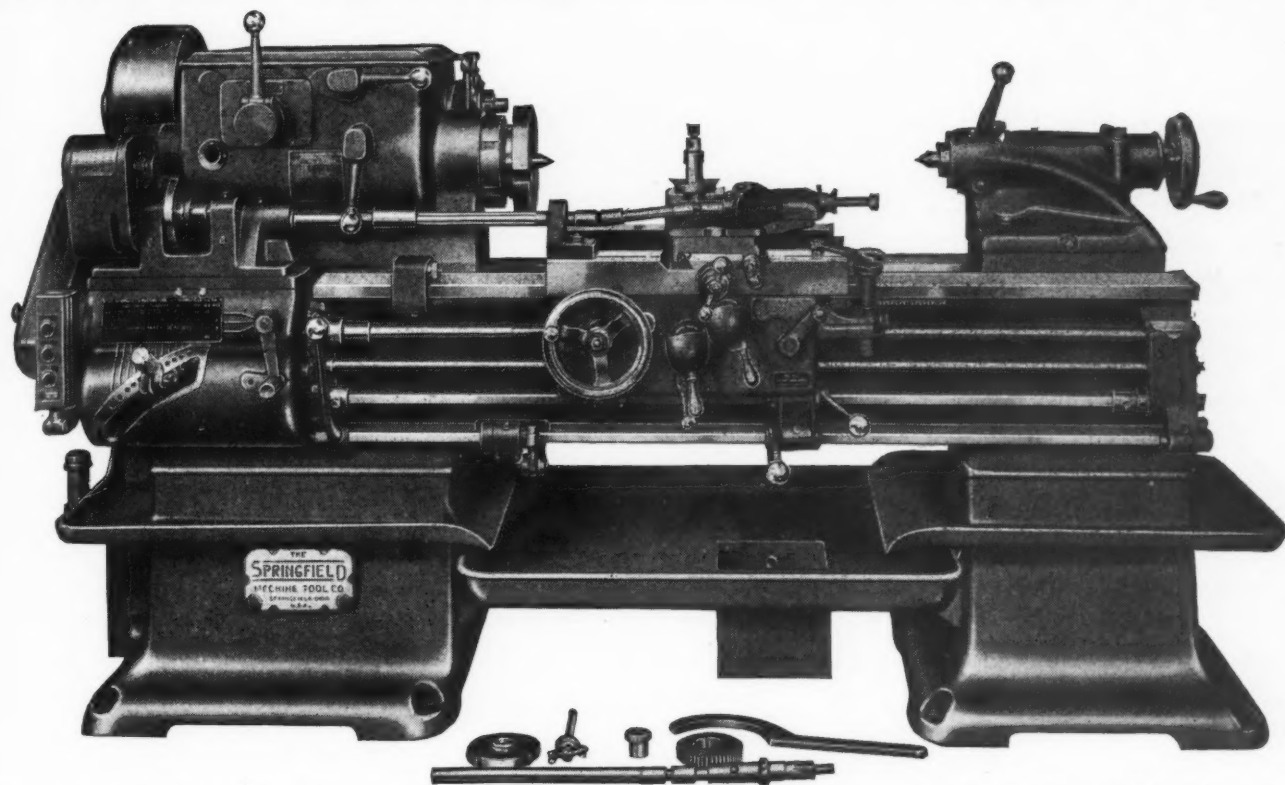
EDGAR A. BECKER, Treasurer

Sworn to and subscribed before me this 1st day of October, 1946.

CHARLES P. ABEL

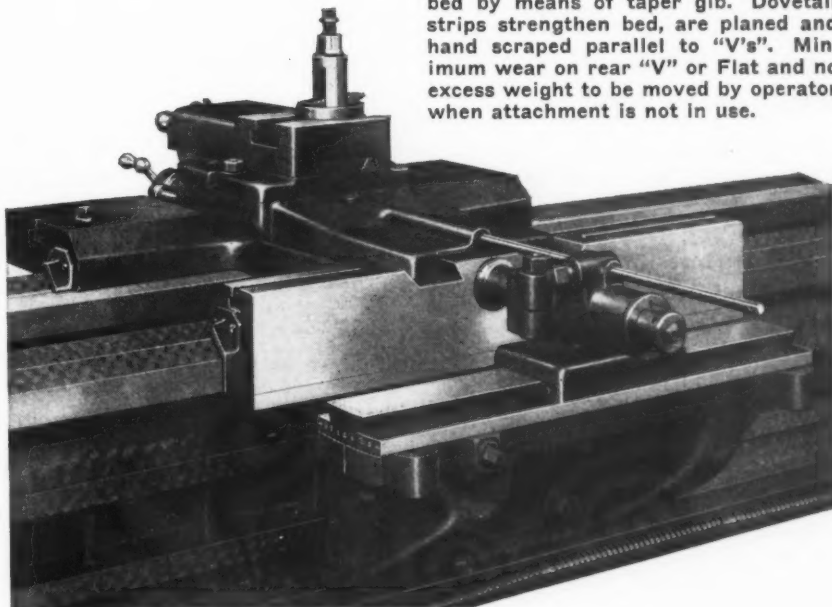
(SEAL) Notary Public, Kings County No. 321
Kings Register's No. 116-A-7
New York County No. 325, New York Register's No. 153-A-7
(My commission expires March 30, 1947)

Meet today's Competition WITH RUGGED, DEPENDABLE SPRINGFIELD TOOL ROOM LATHES



Cost-minded production men choose Springfield Lathes . . . for they know that only a lathe geared to modern engineering practices will "come through" with the speed and accuracy demanded by today's keen competition. Higher speeds, improved cutting tools, increased use of new and tougher alloys—you'll find Springfield Lathes readily adaptable to whatever new requirements arise. From headstock to tailstock, every feature of Springfield design and construction contributes to that adaptability. Precision and operator convenience are typified in the Taper Attachment (right), which assures perfect accuracy, eliminates lost motion, and requires simple adjustment of only two nuts for engagement or disengagement. Other interesting construction details, plus full specifications, in Booklet No. 162. Write for your copy.

TAPER ATTACHMENT consists of very heavy bracket attached to lathe bed by means of taper gib. Dovetail strips strengthen bed, are planed and hand scraped parallel to "V's". Minimum wear on rear "V" or Flat and no excess weight to be moved by operator when attachment is not in use.



**SEND TODAY FOR
BULLETIN NO. 162**

THE SPRINGFIELD MACHINE TOOL CO.
SPRINGFIELD, OHIO

Classified Contents

Design, Fixture and Tool

- Ingenious Work-Transfer Mechanisms for Progressive Dies—*By Charles O. Herb*..... 139
- Lathe Attachment for Cutting Oil-Grooves—*By Harold E. Murphey*..... 175
- Fixture for Grinding the Under Side and Top of Machine Tool Ways Parallel—*By I. F. Yeoman*... 176
- Automatic Feeding and Ejection of Small Cylindrical Parts—*By Mark W. Purser*..... 177

Design, Machine and Product

- Designing Parts for Powdered-Metal Production—*By Irving J. Donahue*..... 169
- Compact Table-Feeding Mechanism—*By Rudolph Sachtleber*..... 172
- Quarter-Turn Mechanism for Transferring Sheets from Press to Oven—*By P. E. Veraa*..... 173
- An Overload Relief Device for Machine Protection—*By H. B. Schell*..... 174

Management Problems

- Strengthen the Industry-Ordnance Team in Days of Peace—*By Charles O. Herb*..... 155
- Army Air Forces' Reserve of Machine Tools..... 163
- Color Improves Working Conditions in a Railroad Shop 167

Materials, Metals, and Alloys

- Silicones Make Possible "Weatherproof" Oil..... 161
- Low-Temperature Alloy for Molds, Patterns, and Dies 178
- Plastic Material for High-Frequency Applications.... 178
- Protective Light-Reflecting Coating for Spray Booths 178
- Aluminum Brazing Flux Suitable for Use with General-Purpose Welding Wire 179

- Pickle Control Improves Sulphuric-Acid Pickling Cycle 179
- Light-Weight Foamed Plastic Developed by du Pont 179
- Water-Repellent Grease Used for Factory Lubrication 179
- Compound Protects Copper and Copper Alloys from Corrosion 179

Meetings and Conventions

- Gear Manufacturers Give Attention to Broad Problems of Industry..... 164
- Industrial Relations Main Topic of National Metal Trades Meeting 180
- New Officers of National Tool and Die Manufacturers Association 226

News of Industry

- New International Standards Organization..... 160
- Engineering News 168
- Ralph E. Flanders Elected to the U. S. Senate..... 171
- News of the Industry..... 221

Shop Practice

- Assembling Operations in a Fisher Body Plant..... 148
- Machining Huge Aluminum Slabs on Scalper of Unusual Design 150
- Chip-Removal and Coolant-Temperature Regulating System 151
- How Special Blending Improves Cutting Fluids—*By James T. Beard, Jr.* 156
- Large Dome Formed from Transparent Plastic Sheets 162
- Surface Finish of Steel in Face Milling..... 165
- High-Speed Assembly of Radiators by Induction Soldering 166
- Air-Cooled Diesel Engine for Small Power-Driven Equipment 167
- Shop Equipment News..... 181

Your Progress Depends Upon Your Knowledge of Your Industry